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THIRD EUROPEAN CONFERENCE ON EXPERIMENTAL SOCIAL PSYCHOLOGY ROYAUMONT, FRANCE 1966

BY

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The Third European Conference on Experimental Social Psychology was held during the period 27 March - 1 April 1966 at Royaumont Abbey. The Conference was unique for two reasons: first, because of the setting in which it was held; and, secondly, because it marked the first exclusively European effort to organize, finance, and conduct a major international meeting in experimental social psychology.

The financing of the meeting was a joint effort of La Fondation de Royaumont pour le Progres des Sciences de l'Homme and L'Ecole Pratique des Hautes Etudes (Sixieme Section). The Foundation provided both housing accommodation and meeting facilities at the Cercle Culturel de Royaumont, which is physically located in the buildings of the old Royaumont Abbey, approximately 20 miles north of Paris. For one who is not in the habit of living in a medieval abbey or a monastery in the French countryside, totally isolated from any village or town, a week at Royaumont is indeed an experience. Even though not entirely germane to the topic at hand, the Abbey and the Royaumont Foundation are sufficiently unique to warrant a few words of description.

Construction of the Royaumont Abbey was begun by King Louis VIII in the year 1229. After a long history as a religious institution, it was partially demolished at the end of the 18th century. In 1905 the remaining buildings and grounds became the property of M. Jules Goüin, and the Abbey has remained in the family since. During World War I it served as a field hospital, and in 1927 was officially classified as a French historic monument. Monsieur and Madame Henri Goüin, the present owners, established the Royaumont Foundation in 1937. One of the purposes of this Foundation was to utilize the Abbey as a center for the stimulation of research and thought in human or behavioral sciences. This goal was realized in 1937 with the establishment of the Cercle Culturel de Royaumont. Generally speaking, the Royaumont Foundation is a privately supported philanthropic venture, closely patterned after American Foundations such as Ford, Carnegie, etc. It was understood that this is the only Foundation in France so organized and operated.

The Foundation has a threefold purpose. First, it actively supports research, through grants, in the area of human or behavioral sciences. Secondly, through the

Société Culturel de Royaumont, it provides a center and in some cases financial support for conferences. Finally, it provides a place where investigators may withdraw to think and write. In connection with this latter function a substantial library is maintained at the Abbey.

One section of the Abbey is a museum and another large wing serves as a center where scholars may work individually or meet in conferences such as reported here. There are 30-40 somewhat sparse although comfortable bedrooms, several large meeting rooms, and two small dining rooms which serve excellent food. The secluded setting of the Royaumont Abbey, and the accommodations, are ideal for conferences.

BACKGROUND FOR CONFERENCE

The present Conference is the third in a series which was initiated by Professor John T. Lanzetta while he was the Liaison Scientist for Psychology in ONR London, in conjunction with Luigi Petrullo, head of the ONR Group Psychology Branch in Washington. During his stay in Europe, Lanzetta became concerned with the lack of development both in theoretical and experimental social psychology, lack of European training facilities, and scarcity or nonexistence of channels for communication among the relatively few Europeans actively working in the field. In order to overcome this professional isolation and stimulate the growth of theoretical - experimental social psychology on the European scene, a meeting was held in December 1963 at Sorrento, Italy. This meeting was sponsored jointly by the Social Science Research Council and the Office of Naval Research. A group of 30 psychologists were invited to the five-day meeting; seven Americans and 21 Europeans. The following year a second meeting was held at Frascati, Italy.

If the Sorrento and Frascati Conferences are considered the first major milestones in the development of European experimental social psychology, the Royaumont Conference well might be considered the second. The first two Conferences were supported by funds from the US and there was a heavy participation of well-known American social psychologists, a number of whom also played a major role in planning and organization. The Royaumont Conference was totally planned and funded by Europeans, and only two Americans attended.

ORGANIZATION OF CONFERENCE

Attendance at the Conference was by invitation only, and participation was limited to 28 European psychologists representing seven different countries and two "invited guests" from the US. Each morning was devoted to one or two formal presentations, which ranged from one to one-and-a-half hours' duration. Following a critique of the presentation by a pre-assigned discussant, approximately one hour was devoted to open discussion. The afternoon sessions were more informal and the participants formed three or four small discussion groups. This permitted detailed discussions of current research activity as well as the inevitable arguments on theory, research strategy, etc. A business meeting of the organization was held Wednesday afternoon. As might be expected in an isolated setting such as Royaumont, the discussions continued through meals and into the evening. In fact, on several occasions the more lively debates extended well into the small hours of the morning.

A summary of the papers presented and a list of the participants at the Conference is contained at the end of this report.

GENERAL COMMENTS AND IMPRESSIONS

This was a well-organized, effectively-managed and clearly successful Conference. With one or two isolated exceptions, all papers and formal discussions were well prepared and meaningful. One had a feeling that the informal small group discussions were sometimes less effective. Where this was so, the difficulty might be attributed to an individual presenting his work in such infinite detail as to preclude a possibly more significant but general discussion on the theoretical implications of the work, etc.

During the course of the Conference it became quite apparent that the goals originally outlined for a European Experimental Social Psychology Association were being fulfilled. Again, a group of 30 social psychologists convened. This time, however, they were all acquainted and obviously had been carrying on lively correspondence during the year. Moreover, a rather surprising number had actively been engaged in collaborative research ventures. The strong American influence on present-day experimental social psychology was very much in evidence, as might be expected. On the other hand, while there was a great deal of discussion

of American work, this clearly was not the focus of either the formal or informal portions of the meeting. In fact, one sensed an exciting and stimulating trend toward maturation of experimental social psychology on the European scene.

A great deal remains to be done before European experimental social psychology has matured to the point of making a major impact in the field as a whole. Nevertheless, rather amazing progress has been made in the last three years. There is still a gross shortage of laboratory and training facilities, and research funds remain a problem. However, the obstacle of communication and interaction between Europeans working in the field appears to have been resolved, and this is certainly a positive step in meeting the remaining problems.

Generally speaking, one sensed a strongly-felt need on the part of many participants to become less dependent upon their American colleagues for research support, training facilities, and theoretical ideas. This attitude was conveyed in many ways, both explicit and implicit, during the Conference. Rarely was there any tinge of hostility toward or depreciation of American leadership (or domination) in the field. Rather, the message conveyed was one of desiring to develop some sort of mature professional identity and sufficient resources to establish a significant European position in the world of experimental and theoretical social psychology.

The business meeting, held halfway through the Conference, was of interest because a number of problems facing the Association clearly were brought into focus. Primary of these problems was that of extending membership, both in Western and Eastern Europe, and at the same time maintaining the level of intensive group interaction and participation which has characterized the three conferences held to date.

Obviously, prior to the Conference the Executive Committee had devoted a great deal of thought to this problem and it was thoroughly aired during the business meeting. The solution adopted, while not entirely satisfactory, represents somewhat of a compromise among alternatives. A maximum of ten new members will be brought into the Association between each major meeting (which are planned at 18-month intervals), and they will be invited to the first conference held after they become members. Attendance at the conference will continue to be restricted

to 30 persons so as to maintain the degree of interaction which now has been achieved. There are approximately 40 members at present, and it is likely that there will be roughly 90 in another 7½ years; however, by that time only a third of the membership will be able to attend the annual meeting. Because of time limitations, this problem was left with a feeling that the course of action taken with regard to membership provides at least an interim solution.

A threefold criteria for membership was adopted which makes provision for accepting persons from countries that are undeveloped in social psychology as well as from those which are relatively sophisticated. Membership is by invitation only and is limited to Europeans. The need for by-laws or an Association constitution became apparent during the course of the membership discussion and provision was made to prepare such a document during the coming year.

The Executive Committee of the Association during the past year consisted of Gustav Jahoda, University of Strathclyde; Serge Moscovici, University of Paris; Mauk Mulder, University of Utrecht; Josef M. Nuttin Jr., University of Louvain; and Henri Tajfel, Oxford University. The success of the present Conference as well as the planning of the summer training schools sponsored by the Association may be traced directly to this group. All were re-elected to the Executive Committee, and the group was expanded by two members in order to cut down on the work load. Ragnar Rommettweit, Oslo University, and Martin Irle, Mannheim University, were elected to the two new positions. Moscovici, who has served as President of the Association over the past 18 months, was succeeded by Nuttin.

SUMMARY OF MAJOR PRESENTATIONS

Dr. Nico Frijda (Amsterdam University), and Professor Gustav Jahoda (University of Strathclyde, Glasgow) were joint authors of a paper entitled: On the Scope and Methods of Cross-Cultural Research. In some respects this was a broad-brush treatment of a wide range of problems in the area of cross-cultural research. However, the authors went beyond highlighting deficiencies in present-day methodology and criticizing past work; in a number of major problem areas there were carefully and systematically suggested solutions to the issues under discussion.

After briefly outling the boundaries of cross-cultural research, an effort was made to identify its various

types and goals. In particular the authors were highly critical of the type of conceptual model currently used in culture-personality studies. The conceptual framework offered by Whiting of the Cornell-Harvard-Yale project was used as an example in their discussions. To illustrate the complexity of the area, the authors proposed an elaboration of Whiting's model which adds several additional variables and provides for their interaction. However, they pointed out that limitations imposed by the state of the art make it doubtful if a model such as theirs can be meaningfully employed at present. Concern with global issues in culture-personality research might more appropriately wait, for example, upon the development of adequate personality assessment techniques. Frijda and Jahoda advocated concentration at present on more limited associations between various aspects of child rearing in Western culture, such as typified by Dawson's work in Sierra Leone and Berry's comparison of the Temne and Eskimos.

The bulk of the paper was devoted to a detailed and penetrating analysis of methodological problems in cross-cultural research, discussed under the following headings: adequacy and comparability of descriptive categories; functional equivalents of the phenomena under study; comparability of investigation procedures; adequacy, representability and comparability of samples; and problems of interpretation.

The concluding section of the paper involved a discussion of future directions which might be taken to cope with methodological problems in cross-cultural studies.

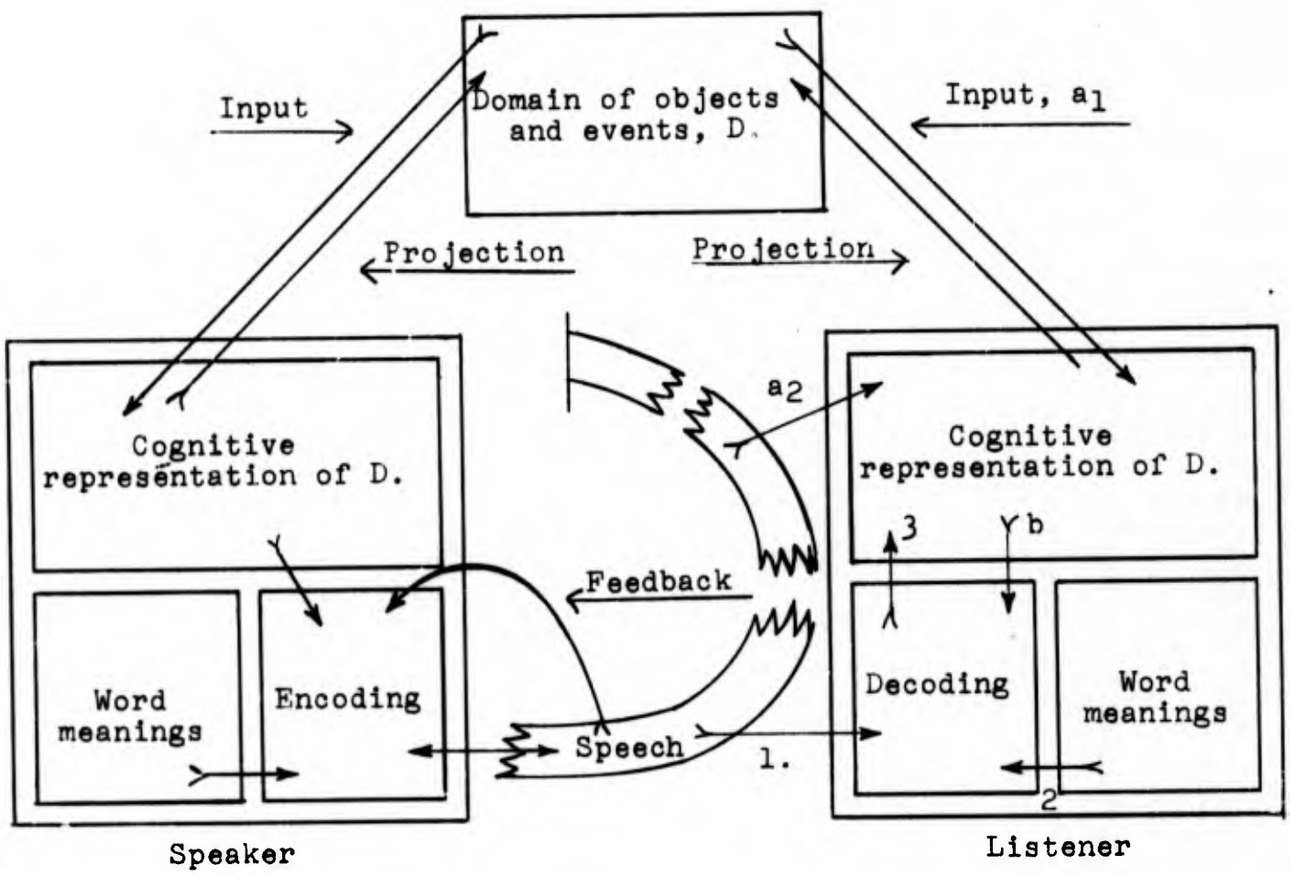
Several approaches were proposed to deal with the problem of equivalence of verbal instructions across different cultures. First, a method, using by Reuning, which requires that the test situation be understandable to the testee without verbal explanation or other outside instructions, was offered. A second possible approach is to employ a learning technique of test administration. Here, something such as the Witkin Embedded Figures test would be utilized. The required test performance and the nature of the task confronting the subject during the test could be transmitted or communicated through the preliminary learning procedures. A further technique considered to hold promise is that of Hammond, where variance attributable to past history is reduced by programming "the subject with regard to the issue being addressed." A suggestion also was made that increased attention be given to the use of behavioral and psychophysiological techniques in measuring response.

The authors strongly advocate a multivariant approach to research strategy in cross-cultural studies. Intracultural comparisons to supplement cross-cultural comparisons are suggested as a means of shedding light on possibly unknown interaction effects of the variables under consideration. Further attention should be given to expanding the number of dimensions upon which cross-cultural comparisons are made so as to rule out possible alternative interpretations. In a similar vein, closer attention should be given to supplementing cross-cultural comparisons with intracultural comparisons along the same dimensions. It is proposed that the significance of the investigator, as a variable in cross-cultural research, be studied through the use of a counterbalanced A-B, B-A experimental design employing investigators native to the cultures being studied. Finally, stress was placed on the advisability of developing experimental designs to cross-cultural collaboration rather than "lifting" or transplanting designs from one culture to another.

In closing, Frijda and Jahoda turned their attention to future directions of cross-cultural research. Here, they have placed an increased emphasis on systematic investigation of cultural and social change in the modern society. The understanding of such changes, and the implications which these hold for potential positive contributions on the part of psychologists, are seen as the biggest present-day challenge of cross-cultural research.

Professor Ragnar Rommettweit, Oslo University, presented the major paper of the second day. His presentation was entitled Linguistic and Nonlinguistic Components of Communication: Notes on the Interaction of Psycholinguistic and Social Psychological Theories. In many respects, this paper is extremely difficult to summarize, as it was itself essentially a summary of a more extensive and detailed work.

The presentation was directed towards outlining the manner in which a cognitive social psychology may serve as the vehicle for integration of linguistics and psychology. Speech and the mediation of messages in the direct person-to-person communication situation were analyzed in terms of linguistic utterance, nonlinguistic features of the communication setting, and in terms of the interaction between linguistic and nonlinguistic aspects of the communication process. Rommettweit's model for integration of psychology and linguistics is set forth below.


Input
Domain of objects and events, D.
Input, a1
Projection
Projection
a2
Cognitive representation of D.
Cognitive representation of D.
3
b
Feedback
Word meanings
Encoding
Speech
1.
Decoding
Word meanings
2
Speaker
Listener

The following situation was used to discuss integration of the linguistic and nonlinguistic components of speech: "A friend of mine enters my office and he is looking at the empty table, where my typewriter is usually located, with an expression of inquiry and curiosity. As I am watching him at that very instant, I say: "Under repair." As apparent in the above diagram, part of the message has been communicated in the encoding and decoding of word meanings. However, perhaps even more important are the nonverbal aspects of this communication. In order for the full communication to occur, there must be a specific "convergence of cognitive orientation" on the part of the individuals involved. The physical absence of the typewriter noted by both the speaker and the listener, has become the center of the external "domain of objects and events" or "D" towards which both persons have projected a certain cognitive meaning. The relationship which Rommettweit postulates between "D" and the actual spoken message is seen above. Here, it should be emphasized that the nonverbal or nonlinguistic aspect of the message cannot be attributed to or explained in terms of stimulus input from the nonverbalized object in question. Rather, this segment of the message depends upon, first, a "cognitive representation" on the part of both the speaker and the listener of the object concerned and the converging projection of this representation onto the domain of objects and events or "D".

Rommettweit next turned to the more linguistic aspects of communication and attempted to show how even here social psychological theory adds to understanding. He contends that linguistic and nonlinguistic components of speech do not have a simple additive relationship in the communication process. The very nature of interpersonal speech and the parameters or limitations imposed on communication serve to structure certain social psychological parameters in the communication process; specifically, the temporal, spatial, and social relationships between the speaker and the listener are defined. At the same time, the need for convergent projection of meaning must be made by both participants to coincide with the "domain of objects and events" to which they are oriented. For example, the physical relationship and proximity of the speaker and listener serve to provide a spatial framework for the message which is communicated. However, there must be a cognitive convergence of the individuals concerned with respect to the objects and events. For example, the meaning of the word "here" may vary greatly -- in one situation to indicate the immediate proximity of the speaker, in

another situation possibly to indicate a city, country, or continent.

The cognitive representations in Rommettweit's model are the processes of encoding or decoding as well as the projection onto the domain of objects and events. Sent and received messages may be looked upon as acts of encoding and decoding respectively. The act of encoding thus becomes the means by which the sender attempts to initiate a particular projection on the part of the receiver. A sent message may be considered "... an act of encoding by which the sender intends to initiate in the receiver a particular projection onto the designative domain." A received message may be tentatively defined as an act of decoding by which the receiver projects from the utterance and features of the situation to that domain. The transmission of a message and the transmission of information are not necessarily synonymous. In order to evaluate information transmission, a comparison is required of the receiver's projection to "D" before and after receipt of the message. Although Rommettweit did not dwell at length on the obvious clear-cut methodological implications of these theoretical formulations, he apparently has undertaken some work under laboratory conditions in an attempt to test the model.

Considerable time was devoted to outlining and discussing certain implications of Rommettweit's model. Attention was given to the relative contribution of linguistic aspects of the message under a variety of conditions and the manner in which the model handles such differences. The importance of environmental or nonlinguistic constituents was explored by several examples in which the same sentence was spoken under a number of different situations. Among these situations, very neatly accounted for with the theoretical formulation, is that in which there is no shared "D" between the sender and receiver of the message in terms either of the present environmental situation or of preceding speech or events. Included here was a discussion of the situation in which the sender and receiver have markedly different reference domains of objects and events associated with a specific word or words in the linguistic component. The paper concluded with a discussion of the concept of situationly-induced designative domain or "D" in relation to problems of self-reference and pragmatic modes or linguistic form.

Regardless of the degree to which one might be interested in psycholinguistics, the thoughtfulness, systematic formulation and clarity of Rommettweit's presentation

certainly commanded attention. The growing contribution of social psychology to the study of psycholinguistics was clearly made evident -- even without the comment "When God made language, he never intended that it would be used in a vacuum but in a speaker-listener relationship."

Professor Leon Festinger, Stanford University, made the third major presentation at the meeting. Festinger was the only participant in the formal sessions who did not read a paper, use notes, or address himself to specific problems in the broad field of experimental social psychology. Rather, he traced the history of experimental social psychology over the past 25 years. After briefly discussing the early work of Allport and Sherif, he dwelt at length on the leadership studies of Lewin and Lippitt, which he considers to constitute the beginning of experimental social psychology. From there he went to a description of the situation surrounding the founding of the Research Center for Group Dynamics at MIT and the subsequent development of the National Training Laboratory. The historical evolution of the field was concluded with a brief discussion of the Center at Michigan.

The remainder of Festinger's presentation was devoted to comments on the present status of experimental social psychology and possible avenues of future development. A diversity of thoughts were presented in this connection. Present-day social psychology was viewed as being in a state of stagnation with a particular need for theoretical developments. For example, new theoretical ideas were seen as being needed to broaden work in the area of influence, and effort should be directed towards exploring biological aspects of social behavior.

In some respects Festinger's presentation may have been somewhat less scholarly than many participants had anticipated. On the other hand, it may have been quite appropriate for this extremely energetic and active group to pause for a moment and obtain a long-term perspective from an individual who has been identified with this field almost from its inception.

Two papers were presented each morning during the last two days of the Conference. Dr. Jaap Rabbie, Institute for Social Psychology, University of Utrecht, Netherlands, presented an abridged and modified version of a paper previously prepared by Rabbie and Horowitz entitled Origins of Ingroup-Outgroup Attitudes. The paper reported on research directed towards isolation of minimal conditions necessary to produce discriminatory ingroup-outgroup

attitudes. This was stimulated by Lewin's book, Resolving Social Conflicts, in which he hypothesized that the main criterion of group belongingness is interdependence of fate. The experimental design provided for a control and three experimental conditions. The later conditions varied in the degree to which the groups were responsible for their own common fate, or that of an outgroup, in terms of being rewarded or deprived of reward for group performance. Two groups, each composed of four randomly selected and previously unacquainted adolescent students, were used for each condition. Each group was identified by a color, such as green or blue. The investigators referred to the groups by their color names, each member wore a tag of that color, and used pens and paper of the group color.

In each condition, the two groups were brought into a room and seated in such a manner as to be visually separated by a screen. The study was introduced as an experiment in "first impressions." Each group completed an Imbedded Figure test and also judged two photographs on several personality characteristics. The experimental treatment consisted of a systematic variation in the manner of rewarding or depriving the group for their "excellence of performance." A transistor radio was given to each member of the rewarded group (a prize which was taken back by the experimenter at the end of the session).

In the control condition, no reward or deprivation of reward took place, although the S's carried out the same tasks as in the three experimental conditions. The reward in the first experimental condition was determined by E flipping a coin to decide which of the two groups would receive the radios. In the second experimental condition, the radios were awarded by E on a completely arbitrary basis; and, in the third condition, a situation was created whereby the rewarded group itself was responsible for depriving the second or discriminated group from receiving the radios.

In essence, the experimental design made it possible to determine, first, if administrative classification into groups was of itself sufficient to generate ingroup-outgroup feelings. The three experimental conditions provided a test of the significance of three different mechanisms of determining the common fate of the group members. Thus, in the first experimental condition chance determined the common fate of the group; in the second condition, a source of external influence became the determining factor in the group fate; and, in the third condition, the action of the

group itself became the primary factor.

The influence of the experimental manipulation in the development of ingroup-outgroup attitudes was measured by a series of scales and a questionnaire which was completed by each S in all eight groups. Through a clever and somewhat complicated procedure, which included each subject standing up and reading background information about himself after the screen dividing the groups had been removed, it was possible to obtain a variety of data reflecting an intra-group cohesiveness and cognitive ingroup-outgroup differentiation.

The results indicated that in the case of the control group, where no experimental manipulation was undertaken, the mere administrative formulation of groups was not in itself sufficient to produce any discriminatory ingroup-outgroup attitudes. This was not the case, however, with the experimental groups. Regardless of experimental condition, and regardless of whether or not the group was rewarded, the differential treatment in each of the conditions produced more favourable in-group than out-group evaluation.

It is interesting to note that the preference for in-groups was not wholly indiscriminate, inasmuch as there generally was no differentiation on those rating-scale items related to performance. Rather, the discrimination tended to be on the social and emotional items. Subjects also tended to rate their own group members higher on the various personality attributes sampled than they rated members of out-groups. These same general tendencies held up on the sociometric measures, showing that subjects generally tended to rate members of their own group higher than members of the out-group. This was true regardless of experimental conditions.

Rabbie concluded his presentation with a rather extensive discussion of the implications of the above results. Both the reward and reward-deprived groups in this study showed a general increase in in-group attractiveness. Accordingly, it was considered that the theories of in-group attractiveness and of frustration and aggression, as formulated by Cartwright and Zander and by Dollard respectively, could not be used to explain the findings. After discussing the results in the light of numerous other recent studies, Rabbie proposed an interpretation in terms of the group members' perception of their social environment. Such an interpretation postulates a tendency on the part of

in-group members to avoid interaction with out-group members.

The next paper, by Dr. Marisa Zavalloni, University of Paris, was entitled Preliminary Observations for Experimental Studies of Identity. Zavalloni opened her presentation by making the point that the concept of identity and the related concepts of ego or self-concept have long theoretical histories, but there is little empirical data to support the theory. In essence her paper constituted a detailed review of existing research data, with a view towards developing hypotheses which could be empirically tested. Zavalloni's concern obviously is with structure or dimensions of identity and not with process. Her literature review was organized around a twofold dimension; first, a simplicity-complexity continuum of identity-attribute organization; and, second, a self-alter identity continuum. The paper, which in many respects resembled the first two chapters of a PhD dissertation, concluded with a list of hypotheses which will be tested in the first of a series of studies which she proposes to conduct in the area of identity theory.

Mr. Guido B. Cohen, Social Psychology Institute, University of Groningen, The Netherlands, reported on a study entitled The Effects of Structure of Task and Group on Productivity. Cohen's studies were stimulated by a divergence in finding between Shaw and Mulder regarding the effectiveness of central versus noncentral structure in problem solving. While Cohen finds little difficulty in explaining the difference in results in the Mulder and Shaw studies, it is obvious that this research has stimulated him to a consideration of somewhat more subtle problems in the area. After a rather careful and cogent analysis, Cohen clearly distinguished between the concepts of task structure and task performance, a difference which constitutes the basis for the present study. Thus, rather than attending solely to task performance, the primary focus of Cohen's research was on varying task structure in terms of interdependency -- essentially, the channels or mode through which information is communicated and ultimately processed in decision making. Interdependency was varied by two specific mechanisms in the present studies: first, through the number of preliminary decisions required in order to make the final or ultimate goal decision; and, second, through a variation in the number of individuals in the decision-making process. It was hypothesized that interdependency increases as both the number of sub-decisions and the number of individuals involved are increased.

Further, it was predicted that centrality of group structure becomes increasingly effective as interdependency of task structure increases. To date, by use of a Bavelas-type task, his emphasis in research has been on the variation of group structure; Cohen is concerned with extending this work to include the effect of varying task structure.

The experimental task consisted of a game whereby the group was required to produce a product or goods on the basis of economic supply and demand. The goal of the game was to produce precisely the amount of goods which could be supported by market demand which was established by E. Each member of the group was supplied with decision-trees to provide information necessary to reach a group decision. In addition to the decision-tree, several groups received a "card" which contained information that aided in determining the best possible course of action in arriving at a group decision.

As predicted, centrality becomes increasingly important in group productivity as interdependency of the group increases. At the same time, an inverse relationship appears between noncentrality and interdependency. This finding was supported both in terms of the number of correct solutions reached and the time for problem solution.

Cohen did not expand on his findings and their theoretical implications in any great detail, inasmuch as the data were incompletely analyzed. He did, however, outline several experiments planned for the future, including one in which conflict of interest would be introduced into the decision-making process.

The final paper of the Conference was presented by Dr. Claude Faucheux from the Social Psychology Laboratory of the Sorbonne. This paper, which reports a study conducted in collaboration with Dr. Kenneth D. Mackenzie during Faucheux's tenure as a Ford Foundation professor at Carnegie Institute, will be published in the immediate future. Accordingly, only a brief summary will be presented here. The presentation, entitled Task Dependency of Organizational Centrality, was concerned primarily with looking at the effect of organization on group structure. The research he reported is an extension of studies made in collaboration with Moscovici, in which the task is manipulated as an independent variable and the organizational structure is treated as the dependent variable. In this work, as in that which preceded it, Faucheux is more concerned with group process than with structure.

It is contended that most tasks used in studies of group organization and structure are of an automatic or analytic nature, so that the solution becomes guaranteed if the appropriate amount of effort is expended. A question is raised, however, as to the manner in which the situation may differ if one uses a task requiring inferences or induction rather than deduction or analysis. It was hypothesized that groups will tend to centralize when dealing with deductive tasks and that they will not centralize if the task is of an inductive or inferential nature. Further, groups who do not follow the above patterns will demonstrate a poor performance.

The S's consisted of 14 groups, each composed of five students from Carnegie Tech. All groups were required to perform two series of tasks, one of which was inductive in nature and the other deductive. A counterbalanced design was employed. Each S was placed in a cubicle so that communication among the group members was through written messages. No limitations were placed on the content of the messages. At the end of the experimental sessions the S's completed a questionnaire concerned with their attitude toward the two different situations. The dependent variables measured under the two conditions included time of solution, number of correct solutions, an assessment of performance, degree of group-member participation, liking of task, and adequacy of group role in task solution. Mackenzie's technique was utilized to provide an index of centrality.

Generally speaking, the results supported the initial hypotheses. The data clearly indicated the point at which groups are left to develop their own structure centralization and inductive tasks to decentralization. Moreover, performance was more effective when the groups centralized in the deductive tasks. As none of the groups centralized when faced with the inductive tasks, it was not possible to draw inferences from the data about the relationship of centralization and task effectiveness in this situation. Faucheux's paper was concluded with a discussion of the implication and various possible interpretations of the behavior of the experimental groups under the inductive task condition.

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TECHNICAL REPORT
ONRL-7-66

NOTES ON PSYCHOLOGY AT THE UNIVERSITY COLLEGE OF SOUTH WALES AND MONMOUTHSHIRE

BY

JOHN E. RASMUSSEN

8 March 1966

NOTES ON PSYCHOLOGY AT THE UNIVERSITY COLLEGE OF SOUTH WALES AND MONMOUTHSHIRE

The last few years has seen a large-scale growth of psychology as a separate discipline in British universities and the establishment of many new departments. One of these is at the University College, Cardiff, a constituent college of the University of Wales.

Cardiff, a city of some 260,000 population, is the capital of Wales and a principal seaport for the Welsh coal fields. The University College, founded in 1883, was the first Welsh college to admit women students. Its enrollment at present numbers roughly 2500 students. For the first few years of its existence students were prepared for final examinations and the awarding of degrees from London University. The University of Wales was founded in 1893, and the University College at Cardiff became one of three Welsh colleges brought together in the new degree-granting University. Subsequently, the University has grown and several new colleges have been added.

A chair in psychology was established at Cardiff in 1962, and a small but stimulating Department has been developed over the past three years. Professor George Westby is the founder as well as present chairman of the Department. Westby came to Cardiff from Hull University, where he is reputed to have developed an excellent psychology department even though he never held the Chair. His reputation as an administrator is being reinforced at Cardiff. Westby has devoted his attention to teaching and building his new department rather than to research. Apparently the "neglect" of research has not impaired his stature as a psychologist, as he is the current President of the British Psychological Society.

In addition to Westby there is the following full-time faculty: one Senior Lecturer, Mr. John Liggett, formerly of the University of Durham; two Lecturers, Dr. J.O.Robinson, formerly of the MRC Social Psychiatry Research Unit, and Mr. Leonard Bloom, who lectures in social psychology. There also are two research demonstrators, who are doctoral candidates in the Department. Dr. J.G. Ingham and Mr. J.M. Gibbs are affiliated with the Department on a part time basis.

The Department of Psychology is housed in two buildings at the present time. The larger consists of a pair of Victorian row houses which have been joined by connecting

doors. Here one finds a rather interesting although complex maze of rooms, individually heated by fireplaces or electric fires, which serve as laboratories, offices, and classrooms. Part of the staff and the remainder of the laboratories and classrooms are in a new, modern, centrally-heated building which is quite nearby. University College is engaged in a major building program at present, so the Psychology Department may anticipate adequate housing at a single location within the foreseeable future.

Courses are offered leading to Honors degrees in psychology, the basic qualification for graduate study, and there are two students doing research for the PhD. As the entire program is new, there have been no graduates from either of the above programs. The general orientation of the Department is toward a presentation of psychology as a discipline which combines both the biological and social sciences. Research interests of the Department, and the expanding laboratory facilities, tend to focus on the general experimental and clinical fields. Provision is also being made to support research in the social and industrial area through collaborative arrangements with the Department of Industrial Relations and the Faculty of economic and Social Studies.

It is quite obvious that the administrative as well as teaching demands placed upon the staff of a new four-man department will be great for some time to come. This problem is further complicated by the fact that the Department is in an already well-established University which has its full share of students. In spite of the time and effort which must be devoted to this early growth phase of the Department, however, an active research program is developing. To some degree this is facilitated by the fact that at least two of Robinson's former research collaborators are now located in the Cardiff area, and it has been possible to establish contacts with established research institutions such as the MRC Pneumoconiosis Research Unit in Cardiff. This latter group is of particular interest in large scale longitudinal and/or field studies of personality development, ageing, etc., because of their carefully defined samples of several Welsh communities.

Robinson presently is engaged in a longitudinal study of the relationship between neuroticism and blood pressure elevation. This work constitutes an extension of the research he conducted several years ago for his doctoral dissertation at the University of London (1),

an extremely well-designed and controlled effort which overcomes many of the methodological weaknesses of previous research on the relationship of hypertension and personality variables. Robinson capitalized on the Rhondda Valley population samples developed by the Pneumoconiosis Research Unit to select a random group of control subjects (N=167). These samples of "total" Welsh communities are ideal for behavioral science studies of "normal" populations. His neurotic group was selected from the out-patient population of a psychiatric clinic in the hospital serving the Rhondda Valley area (N=56). Blood pressure readings of the neurotic group were unknown at the time of their selection as subjects. An hypertensive group was selected from the medical clinic of the same hospital, selection being based solely on objective medical and residence considerations without consideration of neurotic illness.

Each subject was examined in his own home. Carefully standardized blood pressure readings were made and a group of eight psychological tests were administered. The tests used were selected from those described by Eysenck, Granger, and Brengelmann in their book Perceptual Processes and Mental Illness. In addition to the Maudsley Personality Inventory and several other paper and pencil personality type tests, two psychomotor tests were included in the battery.

Because only six of the hypertensive individuals were under 40 years of age, the data analysis was confined to the 40-50 age range. Here, the test battery distinguished between both the control-hypertensive groups and the control-neurotic groups at better than the 0.001 loc. However, there was no significant difference in the scores between the hypertensive and neurotic groups.

In a further examination of the data, using a covariance technique, Robinson found that correction of the neuroticism scores for blood pressure level did not eliminate differences between the control and hypertension group as might be anticipated. Obviously the differences between the two groups were not due solely to differences in blood pressure levels.

At present Robinson is engaged in both a more penetrating study of the relationship of blood pressure to neurosis and a longitudinal study of personality factors in essential hypertension. As a first step in his program he replicated that part of his dissertation concerned with differences between the control-hypertensive groups. With a

large sample of subjects (N=148) in the 41-50 year age group, the previous findings were not confirmed.

Several different avenues of investigation are being followed at present, although none of the work has progressed to the point of publication. The studies outlined above have suggested the possibility that the very act of referral to a hospital clinic may have a significant influence both on blood pressure readings and upon scores obtained on psychological test batteries. Moreover, this relationship may vary with different hypertensive syndromes and with individual attitudes towards symptoms. As part of the systematic longitudinal study, work has been initiated on the development of a measurement technique which will be valid at the beginning and remain valid with repeated testing over a long period of time.

A study also has been initiated on the relationship both between symptoms of hypertension and indices of neurosis to clinically established essential hypertension as a disease entity. One of the primary focal points in this area is on blood pressure liability. Studies to date have been somewhat rewarding in that distinct differences in physical symptoms have been found among groups studied.

A scale to measure individual attitudes towards symptoms and seeking professional advice has been developed, using a Thurstone technique. Results to date with this scale somewhat surprisingly have failed to disclose any significant or major difference between neurotic, control, and hypertensive groups with regard to their attitude towards symptoms.

While Robinson is collaborating in the above work with a number of medical and behavioral science colleagues, he also appears to be taking a much more active part than would be expected in view of his other responsibilities. Even though some questions might be raised regarding the psychological test battery which has been employed to date, one cannot help but be impressed with the careful and systematic approach which has been adopted in the research.

Liggett, the Senior Lecturer in the Department, is now engaged in further studies on a projective technique he has developed for evaluating the self-concept. Three papers have been published on this work, although none have come out in the past five years. A description of this technique, the "Self Valuation Test," and the stimulus materials employed, was published in the Journal of Psychology

in 1957. (2). Liggett presented detailed administration and scoring systems in a later publication (3), and has summarized the work in the Revue de Psychologie Appliquée (4).

Basically, the stimulus materials consist of a set of seven pictures, each containing a face which has been rendered quite indistinct through a process of photographic distortion. The pictures are systematically presented, using the paired-comparisons method, and the subject is required to make a choice according to one of several concepts which are being evaluated. Responses are obtained from a sequence of repeated presentations in terms of the person who is most "intelligent," "attractive," "dominant," "nervous," "best," most like "self", etc. Through a rather clever and rapid scoring system it is possible to obtain scores on a number of comparisons, such as the extent to which the subject identifies the same pictures in his selection of "best" as he does in selecting "self," or "dominant" and "self," etc.

Liggett's technique is rather intriguing, although his findings have been somewhat less positive than might be desired. In the published studies he was able to distinguish a control or "normal" group from a patient population at the 5% loc, but it was not possible to distinguish between the three quite specific sub-groups which made up the patient population. While not published, there has been considerable additional work on refinement of the technique, collecting norms, etc. Probably the most interesting aspect of this work is a shift in the set given to the patient when the test is administered, which results in an increase in the amount of data obtained. Recently, Liggett has been experimenting with an approach whereby the subject is required to "cast" the individuals pictured on the stimulus materials into "roles" they might play on the movies. Liggett's approach to the methodological problems of studying self-evaluation is both interesting and novel. However, on the basis of the research results to date, one is led to doubt whether the Self Valuation Test ultimately will find a significant place in the pool of techniques available for studying the "self" concept.

One might expect that doctorial research undertaken in the Department at Cardiff would coincide with the interests of at least one of the faculty members active in research. As in many British universities, this is not necessarily true. The work of Patrick Westley, a Research Demonstrator in the Department, provides an example in

point. Westley is an extremely well-read and capable individual who is taking his degree under Westby. His research is in the area of animal psychology, although at present there is no other work in this field at Cardiff. Thus, as a first step in his dissertation, it has been necessary for Westley to establish a rat colony in the Psychology Department, build experimental cages, and develop instrumentation.

Westley's primary interest lies in the area of curiosity behavior in animals and its relationship to exploratory activity patterns. The floors of the home cages used in his studies are divided into segments and so instrumented as to permit recording both of activity level and specific movement through space. The early stages of his work have been devoted to a study of individual differences among rats with regard to the manner in which space is utilized "normally" and changes in activity pattern brought about by the introduction of novel stimuli. His procedure in this phase of the work is quite straightforward. Base lines are established for the animals in their home cages both in terms of activity patterns and time cycles. Novel stimuli then are systematically introduced into the cage and changes from the base line behavior are recorded. While these studies are just getting underway, Westley has found rather clear-cut differences in the basic home-cage activity and space utilization patterns of animals otherwise determined to be maze "bright" and maze "dull."

In summary, while Cardiff is a small and relatively isolated Department, one cannot help being impressed with its future potential. A somewhat undefinable atmosphere of vigor, stimulation, ingenuity, and dedication seems to characterize this group. What they lack the money to buy, they build. What they lack in terms of specialized staff is compensated for by affiliating with appropriate, high quality institutions in the Cardiff area. On the basis of a rather brief visit, it would appear that this seemingly happy state of affairs may be traced to Westby and his skill as an administrator and organizer. In some respects the development of this Department constitutes an affirmation of what is understood to be a fairly recent trend in Great Britain of emphasizing administrative and teaching as opposed to research qualification in the appointment of new department chairmen.

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TECHNICAL REPORT
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NOTES ON PSYCHOLOGY AT QUEEN'S COLLEGE, DUNDEE, SCOTLAND

BY

JOHN E. RASMUSSEN

23 June 1966

NOTES ON PSYCHOLOGY AT QUEEN'S COLLEGE, DUNDEE, SCOTLAND

St. Andrews University, founded in 1413, is the oldest university in Scotland and the third oldest in Great Britain. Only Oxford and Cambridge were founded earlier.

Age and tradition can serve to provide stability and structure to a university, but at St. Andrews it would appear as if tradition also has served to retard the growth of psychology as a discipline. St. Andrews has a deep-rooted philosophical and theological heritage which still persists, as indicated by the fact that there are currently three Chairs in Philosophy and five in Theology. A formal Department of Psychology has been in existence for more than 40 years, and a Chair was established in 1963. Because of a number of complicated factors within the University, the Chair has never been filled. Thus, the first Professor of Psychology has yet to be appointed.

To date, St. Andrews' chief claim to fame in psychology might be said to be the people who "have been there" at one time or another in their careers, including Eric Trist of the Tavistock Institute and the late Professor Rex Knight of Aberdeen. Within recent years there has been some indication of change in what might otherwise be considered a remarkably stagnant situation, and the future is looking increasingly bright.

In 1953 the Queen's College of the University was established in Dundee. The Psychology Department was moved from St. Andrews to Dundee approximately five years ago, through a merger of the Medical School and University College. At the same time Mr. Alfred Flook, one of the two present Senior Lecturers, was appointed Head of the Department. Queen's College will become a separate University in October 1967. James Drever, the present Professor of Psychology at Edinburgh University, has been named as Principal of the new University.

It is entirely possible that the combination of a university principal (president) trained in psychology, and removal from the restricting influence of the St. Andrews tradition, will permit a more adequate development of the Dundee Department. While much remains to be done, and there are serious obstacles to developing a first-class department in Dundee, progress during the past five years has been substantial as well as impressive. Within the

past few years the psychology faculty has increased to ten, and the teaching load has decreased from 15 to three hours per week -- a level which could well make many an American psychologist envious.

There are approximately 300 students enrolled in the four-year psychology program, which if successfully completed leads to a "double" honors degree. All students finishing this program receive an MA rather than the BSc which is customary in most British universities. No PhD's have been awarded in psychology to date, although there are four doctoral students enrolled at present. Dundee is not actually isolated as it is only 65 miles from Edinburgh; however, it is out of the main stream of professional life in Edinburgh and Glasgow, so that recruiting of faculty becomes somewhat difficult. As might be expected, the same thing applies to a lesser extent in the case of outstanding students.

The administration of the Psychology Department is rather unique for a European university. All departmental decisions, including expenditure of funds, are made by committees composed of faculty members. This has led to a decentralization of departmental functions which exceeds anything previously encountered by the writer. Reportedly, the procedure is quite effective and saves a great deal of time. From a surface evaluation of faculty morale this report probably is correct. In any event a great deal of mutual trust and respect among the staff would be required. One cannot help wondering if changes will occur when a professor is appointed.

At present the Psychology Department is housed in a new and modern building in the center of Dundee; however, this is insufficient to meet laboratory requirements and additional space has been obtained in the form of an old Georgian house about two blocks from the Department. When renovation of the house is complete it will be quite comfortable -- although possibly on the chilly side as there is no central heating. Even though the problem of laboratory space may have been overcome for the present, a long-term solution has not been found. It is possible that the somewhat elegant quarters in the new building will be taken over by University administrative offices.

During the time available, it was not possible to visit all of the staff members and learn of their research activity. The range of interests is quite wide, from psychophysiology through human engineering to experimental

social psychology. Some work in clinical psychology is going on at the Medical School and there reportedly is a very positive relationship with the Medical School faculty. This has proved to be a particular asset in the area of psychophysiology.

Dr. N.E. Loveless, one of the two Senior Lecturers in the Department, has worked for a number of years in the field of ergonomics. At present he is continuing a series of studies in signal detection under conditions of bi-sensory presentation. This work is supported by the Ministry of Defence.

Loveless started his work several years ago with a basic psychological study to determine if summation occurred when signals were presented through both auditory and visual channels. Using an oscilloscope for the visual presentation and a background of white noise in the auditory sphere, he found that simultaneous presentation of signals did produce a summation effect, as indicated by enhanced performance. This work is quite similar both in procedures and results to that reported by Buckner and McGrath (Vigilance: A symposium, Ed. Buckner & McGrath, McGraw-Hill, 1963), although it would appear that Loveless may have carried out his studies earlier.

The next series of studies was concerned with the question of whether simultaneous presentation of signals through two sensory modalities results in an impairment of ability to detect either of the individual signals. By a technique of measuring response to each modality independently, it was determined that no performance decrement occurs -- a finding which again is at least partly consistent with data generated by Buckner and McGrath. Loveless' move to Dundee apparently interrupted his research activity for some time. However, the work has been resumed and he is well into a series of experiments which are aimed at varying a number of dimensions in bi-modal sensory presentation in order to define perimeters of the problem. An example of this work is a study in which $\sum$ the signal presented through one sense modality is used to alert the subject to a signal transmitted through the second modality. Accuracy of detection is studied as a function of time between signals.

Mr. Allan L. Wilkes, a Lecturer in Psychology, recently initiated a long-term investigative effort in psycholinguistics. Basically, he is attempting to employ

a psychophysiological approach to study the development of semantic patterns. In collaboration with the Department of Physiology in the Medical School, Wilkes has assembled apparatus which uses vaso-constriction as an index of conditioned response to a series of stimulus words. Following the methods of Luria and Vinogradova (reported in the Brit. J. of Psych. 50, 1959), classical conditioning procedures are used to develop a psychophysiological response to a previously neutral stimulus word. Constriction of blood vessels in the finger is used as the index of response. Luria and Vinogradova report an apparent stimulus generalization in this situation which seems to follow a system of semantic connections. Thus, while other neutral words do not evoke the conditioned response, words which are similar either in sound or meaning to the conditioned stimulus do evoke a response.

As a first step in his research program, Wilkes has attempted to replicate the Luria and Vinogradova study. His results to date follow the same general pattern as found in the Russian study; however, he has been unable to achieve the experimental extinction of response reported in the earlier work. Thus, after as many as 60 trials, Wilkes' subjects continue to present a conditioned response whereas Luria and Vinogradova report extinction between 25-40 trials. At the present time it is not clear whether the inability to fully replicate the earlier study is due to more sensitive recording instruments, differences in procedures, or to the great multitude of unknown variables which so frequently prevent replication in the behavioral sciences. In any event, Wilkes is of the opinion that it is rather important to overcome the problem of experimental extinction before he can proceed with his work.

One of the more impressive members of the Dundee faculty is Dr. Terence Lee, a Cambridge PhD who has been a Lecturer at St. Andrews since 1956. Lee might best be identified as an experimental social psychologist. For some time his primary and enduring interest has been in the area of space utilization; first, along the lines followed by E.T. Hall at Illinois Institute of Technology, and more recently in terms of the sociospatial aspects of urban and rural planning.

Lee also has a continuing interest in classical laboratory studies of group learning phenomena, and has carried out a series of well-conceived and executed experiments in this area. These studies, reported in

some detail in ONRL Report C-15-65, are being continued by two of his doctoral students. However, Lee himself has become somewhat discouraged in this area because of the general lack of funds for such research in the UK. While this very realistic problem may be overcome through recently revised procedures for funding Social Science research in Great Britain, it is too early to tell at the present time.

Lee's early work on space as a variable in human behavior was concerned with the relationship between distance traveled to school, mode of transportation, and emotional adjustment of rural school children. This work, published in 1957[1], was the first of a series of studies directed toward investigating the psychological and sociological impact of consolidating rural school systems. A sample of 883 children (age 6-8 years) from 57 rural schools in the County of Devon were assigned to one of four categories: short walk to school (one mile or less); long walk (over one mile); bus ride of less than 15 minutes; and a bus ride of more than 15 minutes.

Each pupil was rated by his teacher on eleven behavior traits (such as aggression, concentration, popularity, etc.) using scales which Lee devised for the study. Through the use of a specially devised "Rating Board" the pupils in each class were ranked in relation to one another along a continuum of normal-neurotic for a given trait. Specific descriptive anchor points were provided for each scale. The ranking procedure was performed separately for each of the eleven traits and the ranks were transformed directly into numerical values through a scale attached to the Rating Board. While some questions might be raised regarding the development and validation of the technique, the results were quite clear-cut with differences between the four groups all being significant at the 1% l.o.c. The highest index of positive adjustment was found with children walking less than one mile, next was the short bus ride, followed by the longer bus ride and the long walk in that order. After examining the above and supplementary data in terms of possible rural-urban differences in child-raising practices, and in terms of fatigue, Lee considers

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[1]Lee, T.R., On the Relation Between the School Journey and Social and Emotional Adjustment in Rural Infant Children, Brit. J. Educ. Psych., 27, 101-113, 1957.

that his findings can best be interpreted in terms of longer transit times being perceived by the child as involving a reduced accessibility to the mother. A later study of two matched groups of country parishes showed school reorganization to be related systematically to population decline.[2] Thus, it would appear that consolidation of rural schools is accompanied by a shift of population toward the consolidated schools. In a more recent unpublished study, Lee found that the move away from small country schools does not have any significant influence on the social status hierarchy of traditional country occupations, as perceived by schoolchildren.

Lee's doctoral dissertation at Cambridge and his most recent work have been in the study of the urban neighborhood. Basically, he has been concerned with elucidating and measuring the individual's perception, structuring, and organization of his neighborhood, as well as determining the behavioral implications of this "socio-spatial scheme." Lee contends that an urban neighborhood is more than a geographically-defined entity or a collection of people; it is seen as a synthesis of physical objects, social relationships and space. Moreover, it is hypothesized that there are a number of lawful and predictable relationships between human behavior and neighborhood characteristics.

Lee has adopted a phenomenal approach to the definition and measurement of neighborhoods. During the course of a rather extended and detailed semi-structured interview, the subject is requested to draw lines on a survey map of his general area in order to outline what he considers to be his neighborhood. The map is of such a scale that all local streets, buildings, and the subject's own dwelling are clearly identifiable. The interview, per se, is directed toward developing information as to the nature of the subject's social interaction and geographical areas involved, as well as shopping behavior, organizational affiliation, meeting attendance, etc. Data also is obtained on background factors relating to social-economic status, length of residence, etc. The term "neighborhood" is never mentioned in connection with the interview; however, it is

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[2] Lee, T.R., A Test of the Hypothesis that School Reorganization is a Cause of Rural Depopulation, Durham Research Review, Vol. III, No.12, 1961

employed when asking the subject to outline his locality on the survey map.

The Land Use Surveys maintained by the County Planning Offices in Great Britain permit a determination of the exact location, condition, and use of every existing structure in a given county. This information, contained on IBM cards, provides Lee with his third major source of data. Here he categorizes data into three groups: Dwellings, Shops or Stores; and, "Social Amenity Buildings" which includes schools, public buildings, clubs, etc.

The data for Lee's major study, of which only a segment has been published[3], was collected in the city of Cambridge. Nineteen of the 35 existing polling or voting districts were systematically selected and sampled. This procedure yielded 219 households in which the housewife was interviewed. (An additional 16 households were discarded, half because no contact could be made with the occupants and the remainder because of refusal to participate in the study.) While husband-wife differences in response are anticipated, this variable has not been examined to date. The final interview and map tracing procedures were developed during the course of pilot studies. Of significance here is the fact that the size and dimensions of the survey map segment presented to the subject did not influence the nature of the neighborhood map which was outlined.

Seventy-five per cent of Lee's sample were conceptually able to organize the significant space and persons around them in such a fashion as to outline their phenomenologically-perceived neighborhood on the survey map. Of those who did not trace a map, approximately half felt that they would be able to do so after they had been residents of the area for a longer period of time. There were pronounced individual differences in the maps traced within the 19 voting districts sampled. At the same time, when the individual tracings are superimposed on a single survey map a number of rather clearly defined neighborhoods begin to appear. It is of interest to note that the phenomenologically defined neighborhoods do not at all conform to those defined either through conventional techniques of defining geographical boundaries or of socio-economic grouping.

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[3]Lee, T.R., Psychology and Living Space, in: Transactions of the Bartlett Society, Vol. 2, 1963-65, Bartlett School of Architecture, Univ. Coll., London.

In order to check on the accuracy and significance of the phenomenological neighborhoods, the location of friends, stores, and public buildings visited by each subject were grouped into eight distinct categories. An analysis of the relationship between behavioral activity reported by the subjects and their neighborhood maps disclosed the activity to be concentrated within the cognitive map boundaries in all eight categories, with statistical probabilities either reaching or exceeding the 0.05% l.o.c. in every category.

While the above analysis supports the concept of an individual neighborhood schema, it does not permit an assessment of individual differences in the degree to which one participates in, or becomes involved in, his environment. Lee has evolved a measure, the Neighborhood Quotient (NhQ), to express such involvement or attitude. Although the calculation of the NhQ is rather complex, in principle it amounts to no more than a procedure for factoring out the variable of opportunity to participate in neighborhood social intercourse which arises because of area differences in density.

By employing the NhQ, it has been possible to obtain data as to the relative significance of factors such as social class, age, and length of residence, in determining involvement in neighborhood activity.

This work on the urban neighborhood is sufficiently extensive that no more than a flavor can be given here. It has a basic theoretical orientation in Sir Henry Head's concept of <u>schema</u>, as elaborated by Sir Frederic Bartlett. While Lee has not been concerned with developing a theoretical model of urban neighborhood space utilization and behavior, the direction of his work clearly is derived from theoretical rather than empirical considerations. To date, the work has been rigorous, careful, and systematic. A number of his findings hold considerable practical implications for town planning -- for example, the phenomenologically perceived neighborhoods are remarkably constant in actual geographical area regardless of whether they are in the densely populated slums or middle class suburbs. It is anticipated that this work well may attract considerable attention when it is published.

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PSYCHIATRY IN THE NORWEGIAN DEFENSE FORCES

BY

JOHN E. RASMUSSEN

18 November 1966

PSYCHIATRY IN THE NORWEGIAN DEFENSE FORCES

The Norwegian armed forces are relatively small, numbering less than 35,000 men. For some years they have operated an integrated tri-service medical department, although each branch of the service has its own surgeon-general and medical officers who wear the uniform of and are primarily identified with the given service. Thus, the integration actually is more apparent in the administration, budgeting, and broad policy than it is in the actual practice of military medicine. Historically, the Army and Air Force have never developed full-scale neuropsychiatric (NP) programs. The Navy, however, at one time had a substantial NP effort.

From approximately 1950 to 1963, Dr. John Greve-Brun was the Surgeon-General of the Norwegian Navy. Greve-Brun was extremely interested in the problems of military neuropsychiatry, although he himself was not trained in this discipline. A man of independent means, he devoted his full time to the Navy rather than maintaining a private practice as is customary for Scandinavian military medical officers. Under him, the first psychiatrists were brought into the Norwegian Navy, and a group of clinical psychologists were commissioned and served in uniform. In many respects this was a golden era of Norwegian military neuropsychiatry. The psychologists and psychiatrists formed a closely-knit unit and embarked upon a rather extensive program of research, assessment, and therapy. None of this work has been published in English, although some of it is of sufficient interest to warrant summarizing.

In 1952 Commander Per Joren, chief psychologist of the Royal Norwegian Navy; Dr. Johan F. Thaulow, the senior Navy psychiatrist; and Commodore Ole A. Mortensen, the present Surgeon-General, embarked upon an extended study of selection procedures in the Navy. The primary aim of the research was to institute a selection procedure which would decrease the disciplinary difficulties experienced in the Navy.

Parenthetically, it should be noted that nearly all enlisted men in the Norwegian armed forces are conscripted through a national service system which requires 16 months of active duty in one or another branch of the services from every able-bodied Norwegian male. All conscripts for the Navy are drawn from the Merchant Marine service. Traditionally, the Norwegian Merchant Marine has in turn drawn its recruits from individuals who have had difficulty in adjusting at home. Thus, the enlisted input into the Norwegian Navy contained an inordinately large proportion of character disorders, and for many years disciplinary rates in the Navy were far in excess of those

found either in the Army or the Air Force. A program was developed which included both a basic test battery and a clinical evaluation. In addition to ability and manual dexterity tests, and a biographical questionnaire, background information was obtained on each man from public registers maintained by the police, school system, and labor bureaus. All incoming recruits received individual interviews by psychologists and problem cases were referred to consulting psychiatrists.

Prior to the introduction of the selection program in 1956, approximately ten percent of new conscripts were rejected for NP reasons on the basis of their records. By 1960 the NP-rejection rate of recruits had been increased from 10 to 15%; however, the disciplinary offense rate had been reduced by 60%. That is, in 1960 there were 60% less offenses than in 1955, the last year before the program was introduced. During the same period there was no reduction in disciplinary rates of the other two branches of the service, so it is not possible to attribute the change to a difference of personnel input or service management.

During the early stages of the above program, another investigation was initiated by Thaulow to determine the post-service adjustment of 593 men discharged from the Navy for psychiatric reasons. It was found that the discharged group had a record of approximately five times as many legal offenses before reaching the age of 25 as a control group which completed their naval service, and they had twice the rate of offenses beyond the age of 25 as the controls. Data of this sort led Thaulow to the conclusion that psychiatric separation produced a significant emotional trauma. Thus, a third research program was initiated to reduce the number of men separated from the Navy on psychiatric grounds. Here an attempt was made to develop a treatment program along the general lines of a therapeutic community; however, the focus of management responsibility was placed on line officers and petty officers rather than on medical department personnel. Basically, Thaulow and P.S. Albertsen, a Navy psychiatrist who collaborated with him, consider the tendency of line personnel to shift responsibility for management of such problem cases to the medical department to be one of the primary problems in dealing with character disorders in the military service. Their approach to handling problems of this nature was to shift the responsibility back to the line and help the Navy officers and petty officers to develop techniques for dealing with the immature sailor.

The study was carried out at a Norwegian Navy base located on a small island in the Oslo fjord. This facility had existed for some time and was staffed by men randomly

assigned to the duty of repairing antisubmarine nets. It was ideal for the study because it was reasonably isolated and all of the individuals working at the command were in close contact. It was anticipated that men would be assigned to the therapeutic community program until they demonstrated an adequate service adjustment. At that time they would be transferred to other units. Periodic group therapy sessions were conducted by the psychiatrists; these included the line officers and petty officers as well as the seamen who served as subjects. As might be anticipated, considerable difficulty was encountered through resistance on the part of the line officers. In spite of the fact that these men had been specially selected for this assignment, their training and experience as sea-going line officers were such as to make it extremely difficult for them to engage in the group therapy situation. Generally speaking, no startling results were obtained with the subjects, but the study was considered to be successful because the investigators learned how programs of this nature might be conducted. Unfortunately, before the study could be replicated major changes took place within the Norwegian Navy medical department and all of the psychiatric work came to a standstill.

The Navy NP program as established by Commodore Greve-Brun was an almost autonomous segment of the Norwegian military medical department. There was little or no contact with the Department of Defense Military Psychology Institute, the Army, the Air Force, or other related groups. Both the Navy psychologists and psychiatrists were responsible solely to Greve-Brun. A multitude of unrelated but coinciding events brought the program to a rather complete and final termination.

Greve-Brun resigned from the Navy and became Executive Secretary of the Norwegian Medical Association. The chief psychologist, Johan, who had been one of the major motivating forces in the program, also resigned at about the same time as Greve-Brun. Thaulow began to devote full time to his private practice and Albertsen left the Navy.

In 1962, as a result of a Norwegian Defense Department study, both the Air Force and the Navy psychology programs were disbanded; and the responsibility for all personnel selection was assigned to a central military psychology institute. At the same time, the psychiatrists working with the Navy found it impossible to continue their research program without the assistance of their psychological collaborators. Essentially, the role of psychiatry in the Norwegian Navy was reduced to one of almost complete nonexistence. Thaulow remained as a consultant to the Surgeon-General but was not clinically active. In fact, his consulting was restricted primarily to giving

advice on the handling of difficult administrative problems.

In retrospect, particularly to one who is familiar with the program, its termination was extremely unfortunate in many respects. First, the Norwegian Navy is small enough to permit one to conduct carefully-controlled NP research projects which would not be possible in the US Navy because of the sheer size of the organization. Secondly, a highly effective and well-trained team had been developed. Moreover, this team had the full support of the Navy medical department. Finally, and most important, the program had actually produced results, particularly in selection, which might well be the envy of many military psychiatry groups throughout the world.

Within the past few months there has been renewed activity in Norwegian military psychiatry, although the focus of this activity is at the Department of Defense level. Dr. Arne Sund recently has been appointed as Chief Psychiatrist for the Norwegian forces. Sund, who has experience as an army medical officer, is a young, extremely pleasant, and energetic individual who obviously is quite challenged by the task of building a meaningful psychiatric program within the forces. During the few months Sund has been in office he has accomplished a great deal -- at least in the primary stage.

As in the case of almost all military medical officers in the regular forces of Norway, Sund's appointment in the Department of Defense is half rather than full time. The remainder of his time is spent on the staff of the University of Oslo Psychiatric Clinic, where he is engaged in a rather extensive follow-up study of men separated for psychiatric reasons from the Norwegian forces.

Fortunately, Sund relates well to the surgeons-general of all three services and reportedly has their support. There are no psychiatrists identified with a given service in the Norwegian forces beyond individuals, such as Thaulow, who may serve as consultants to a surgeon-general. As in most countries, military psychology is not looked upon as being particularly rewarding by Norwegian clinicians, and recruiting has proved to be an extremely difficult problem. For the most part, the practice of psychiatry in the Norwegian forces now is confined to a limited diagnostic service. In isolated cases, the psychiatrist does spend time with the military commanders, acting in a role of a mental hygiene consultant. The only military hospital in Norway has been closed and all psychiatric treatment of armed forces personnel is carried out in civilian hospitals. Both Sund and Thaulow consider this to be a distinct handicap to the practice of military psychiatry. In

fact, Thaulow has a generally pessimistic view about the future of military psychiatry in general as far as the Norwegian forces are concerned. Sund is far more optimistic, and it is entirely possible that the future may be brighter than Thaulow is inclined to believe. In talking to the two men, one obtains the impression that Thaulow might be considered an excellent example of everything the clinician should be, and Sund is an individual whose particular talents are in the field of psychiatric administration.

At present there are six psychiatrists directly affiliated with the military service, in addition to Thaulow, who still does not see military patients but serves as a consultant to the Surgeon-General of the Navy. The psychiatrist at Stavanger, which is primarily a naval training center, spends half time with the Navy and probably is more active than any other single individual. He spends each morning at the training school consulting with the staff officers when he is not working with the Defense Department psychologists in screening recruits.

The psychiatrist at Trondheim has been retained on a half-time basis to provide services for what amounts to essentially the northern half of Norway. This doctor works in the Trondheim hospital and is not available to make trips out of town. Accordingly, it is necessary for all military patients to be referred to his office. In many cases this involves sending a man some 500 miles for a psychiatric consultation. Parenthetically, it should be noted that the difficulties of transportation in northern Norway are almost inconceivable. The Trondheim psychiatrist serves Army, Navy, and Air Force units without distinction.

A third psychiatrist is located in the town of Lillihammer in central Norway. This doctor works primarily with Army personnel and is responsible for psychiatric service at ten different commands, most of which are training units. In carrying out his work he routinely visits the units to meet with company commanders in the role of a mental hygiene consultant. On the other hand, because of the requirements of his civilian practice, the visits to the military stations often are at lengthy intervals. Thus, it is frequently necessary for the station medical officers to refer patients to his office in Lillihammer. Again this practice involves lengthy travel on the part of the patient.

The psychiatrist at Bergen works primarily with naval personnel, but again he is available mainly on a consultation basis. In Oslo, Sund occupies his full time in the Department of Defense with administrative matters and does not see military

patients, although -- odd as this may seem -- he does see civilian patients at the University clinic. There is a half-time psychiatrist who works in the central military dispensary in Oslo.

The strategically important northern part of Norway is guarded by a brigade of 5000 men. At the present time there is no provision for psychiatric care of this group of men and consultations must be referred to Trondheim.

Sund has formulated plans which will result in a somewhat drastic change in the picture outlined above. In fact, if he is successful in implementing his plans the ratio of psychiatrists to active duty personnel will be greater than in the US forces. In the fall of 1966 there will be a review of medical care in the Norwegian forces and Sund has prepared a plan for expanding neuropsychiatry. Norway is divided into 15 military districts. Sund, in cooperation with the Director of the Military Psychology Institute, has developed a plan for staffing each of the 15 areas with a mental hygiene team. At the minimum, this team will consist of one psychiatrist and one psychologist. Wherever possible there also will be a psychiatric social worker. There are no clinical psychologists working with the military forces at the present time, and this specialty is probably in greater shortage than psychiatry in Norway. Thus, the proposed expansion constitutes an extremely optimistic program. However, one suspects that the plan may be successful if Sund and the chief psychologist of the Norwegian Forces are persistent enough in their recruiting efforts. In fact, it is entirely possible that the lack of an active NP program may be attributed primarily to the fact that no-one there before Sund was in a position to accept the responsibility for administration of the program and for recruiting.

The program, as conceived, would be directed primarily toward a mental hygiene unit model of the US Army. The first additions to the psychiatric program definitely are planned for the northern brigade. In order to implement the effort, doctors who have completed only part of their residency training will be utilized as psychiatrists. Here, the idea is to use doctors with three of the required five years of specialized training required in Norway for certification as psychiatrists. Actually, when compared to US military psychiatry programs, even this reduced level of training would result in an exceedingly high quality of professional attention.

Inasmuch as he is relatively new at the job, Sund has not formulated plans for psychiatric programs extending beyond the mental hygiene consultation unit. It is quite likely,

however, that the basic assessment program, and selection for stressful duties, will remain a responsibility of the Military Psychology Institute.

A problem which obviously is unresolved to date is that of the extent to which military psychiatrists should provide treatment for patients. As indicated earlier, almost all enlisted men in the Norwegian Forces are conscripts. There is a rather sharp dichotomy of opinion as to the role of the military psychiatrists and clinical psychologists. On the one hand there is a rather vocal group which advocates providing treatment wherever possible, inasmuch as facilities in most civilian communities for such care are quite lacking. Another group takes the position that it is not the function of the military to provide care for the general population; rather, this group is of the opinion that the military psychiatry program should be focused solely on maintaining an effective fighting force. After hearing advocates of both positions, one is left with the feeling that it may be some time before this issue is fully resolved. Obviously there are numerous political as well as professional considerations involved.

In his recent activity at the Oslo University Clinic, Sund has been engaged in a rather extensive follow-up study of military personnel separated from the Norwegian armed forces during the period 1950-1955. Somewhat over 400 men were separated during this time, and he has selected a sample of 220 who were inducted into the service from the southern half of Norway. After eliminating four subjects who are dead, four who have emigrated to the US, and nine who were unavailable for various reasons, the final number of subjects in the study is 203. These include men treated either as in-patients or out-patients in the military service during the period reported above. Of the sample currently being studied, approximately 50% were returned to duty after their psychiatric treatment. After the 16 months of primary service required of every male, he has an obligation of nine additional years of reserve service. Every third year the reserve military man is required to spend three weeks on active duty. Of the sample studied, approximately 25% have remained in the reserve and have fulfilled their military obligations.

Two control groups are being utilized in the present study. One group consists of 200 men selected at random from conscripts in the Engineer Corps. Eighty percent of the control group completed their reserve service as compared to 25% of the psychiatric patient group. At the present time Sund is working up data on a control group which has been matched with the patients for age, education, social and economic status, etc.

Of the patients sampled, 20% had their service deferred for either one or two years because of their psychiatric symptomatology. Thus, they were called to active duty, examined, and returned home for recall at a later date. On the basis of available data, approximately one man in 20 of those sent home was able to return and complete his normal period of service. Thus, Sund does not believe that the Norwegian policy of deferring character disorders for service at a later date, rather than discharging them as in the US forces, is a particularly worthwhile procedure.

Analysis of the follow-up data has not been completed. However, among the patients who were returned to duty and served effectively through the remainder of their military service, 60% demonstrated adequate postservice adjustment, 29% slight impairment, and 10% marked difficulty in adjustment. Among the ineffective soldiers who were separated from service, 34% showed an adequate postservice adjustment, 35% exhibited a slight impairment, and 32% a marked impairment. The criteria for effectiveness included factors such as time unemployed, duration of unemployment, hospitalization, and conflict with civilian authorities. Because of the Scandinavian procedures for maintaining statistical records on the total population of the country, it is possible to obtain extremely accurate follow-up data. In addition to interviewing each subject, Sund has information from at least one relative, the individual's employer, and his family physician. In addition, data are available from the Central Penal Register, the Register of Fines (a central file of traffic violations, etc.), the Labor Exchange Register, and the Alcoholic Register. Data on performance after return to duty and breakdowns by diagnosis have not yet been analyzed; however, the information regarding disciplinary difficulty has been. Approximately 20% of the 203 men in the patient sample have been in trouble with the police since their release from activy duty. This is opposed to approximately 5% of the randomly selected control group. Sund hopes that it will be possible to use data obtained from this study to refine the selection standards for military service.

At the present time one might safely say that there is relatively little in the present-day Norwegian military psychiatry program which would be of interest either to civilian or military psychiatrists in the US. On the other hand, some of the work done in the Navy prior to 1962 well might be worthy of detailed study by the US Forces. The program for deferring active duty in the case of selected character disorders has proved to be less successful than anticipated. However, one obtains the feeling that this was not a rigidly administered program. Although the present picture is not particularly

bright, it is likely that the Norwegian military psychiatry program will become increasingly interesting and important. In particular, the research possibilities offered in the Norwegian forces are unexcelled. The forces are small enough to carry out well-controlled studies and large enough to make the studies meaningful.

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PSYCHOLOGY AT THE TECHNICAL UNIVERSITY OF NORWAY, TRONDHEIM

BY

JOHN E. RASMUSSEN

20 December 1966

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PSYCHOLOGY AT THE TECHNICAL UNIVERSITY OF NORWAY, TRONDHEIM

Trondheim is a relatively small, moderately isolated, but important city in the north of Norway. Many streets are unpaved, and there is a curious atmosphere of the primitive blended with wealth. In the sunlight (and there were five consecutive days of warm and sunny weather in June this year) the city is quite intriguing. The brightly painted houses set in the valley and surrounding hills, the stately cathedral and university, the deep-green grass, flowers, and water all merge to give the city a quaint charm; a charm which may not be maintained with the increased industrialization and addition of modern office and apartment buildings. At one time Trondheim was the capital of Norway, and the King still maintains a rather unpretentious wooden house in the center of the city. It remains the gateway to the far North.

The Technical University of Trondheim was established in 1910, and is the only institution in Norway which grants degrees in engineering and architecture. Entrance standards are high and competition for admission is keen. There are a number of new buildings and more are being constructed.

It is somewhat surprising to find that there are two separate Psychology Institutes at the University, although only four courses are given in psychology, none of which are required; and there are no undergraduate majors. Moreover, it is intriguing to find graduate students in an Institute staffed by a single man.

INSTITUTE OF PSYCHOLOGY AND SOCIAL RESEARCH

The Institute of Psychology and Social Research was founded in January 1965 to provide the University with a formal capability in the behavioral sciences. The Norwegian from the North has been characterized as being somewhat slow and deliberate in making changes; and the University of Trondheim has a reputation, even in that part of the country, for being a conservative institution. Thus, all factors considered, the timing for formal introduction of psychology into the curriculum is just about right. By establishing a new Institute it was possible for the older Institute for Industrial Social Research to remain free from teaching responsibilities as well as to avoid the administrative complications of conducting research under University sponsorship.

Docent (Associate Professor) Julius Marek, who has been in charge of the Institute since its founding, is the only

fully trained staff member. In describing the organization and its activity, therefore, one essentially is speaking of Marek. Although he holds a permanent faculty appointment, he is not Norwegian. In fact, Marek was born in Poland, is an Australian citizen, and received his training in Australia, the US, and England. He lectures in English, writes in both English and Norwegian, and usually speaks to his Norwegian colleagues in English, inasmuch as they look upon such conversations as an opportunity to maintain proficiency. It might be noted in passing that this makes it easy for an English-speaking foreigner to join the faculty, but it also makes his mastery of Norwegian difficult.

Before coming to Norway two years ago to work in the Institute for Industrial Social Research, Marek was on the staff of the Tavistock Institute in London. Although originally trained in classical experimental and animal psychology, his exposure to the Tavistock and a PhD from the London School of Economics have resulted in a strong leaning toward the development and application of social psychology theory in the study of industrial organizations. He also has an interest in community planning problems, consumer research, and the psychology of perception.

While at the Tavistock Marek became interested in problems of industrial automation and worked extensively on the application of Trist's concept of the "socio-technical system" to this area. In addition to an early publication with Emery[1], a recent study of the interpersonal problems engendered in an actual factory by changing from a "batch" to a "flow" production line should appear soon[2]. Here, Marek has attempted to elaborate the concept of "socio-technical system" through the application of Heider's balance theory.

Academic Program

The formal introduction of behavioral science into the Trondheim curriculum has proved to be a slow and difficult process. The problems appear to stem from reality factors

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[1]Emery, F.E. and Marek, J., Some Socio-Technical Aspects of Automation, Human Relations, 15, 17-25 (1962)

[2]Marek, J., Social and Psychological Responses to Changing Environmental Demands, unpublished manuscript.

rather than significant resistance on the part of other faculty members or departments. Basically, the students already are heavily loaded with engineering and/or architectural subjects and a major reorganization of the total curriculum will be necessary if psychology becomes either a required or credit-bearing elective subject.

Marek's aim in developing a behavioral science course at the University is to modify the present concept of "technical" or engineering training so as to include a consideration of social or human problems. On the one hand, this is an attempt to instill a sensitivity to man - machine interface problems in engineers from the beginning of their training. Marek's goals go beyond this aspect as he is concerned that engineers gain an understanding of the human aspects of technological or industrial organizations and processes. This latter aim is justified on the basis of data which indicates that a major portion of the engineer's professional career will be spent on nontechnical problems.

Within the past 18 months four courses have been developed. These may be taken in addition to the student's normal workload. Although no academic credit is given, a record is made of enrollment on the student's transcript. The present courses are:

Problems of Work -- An introduction to labor-management relationships given in conjunction with the Economics Department.

Psychology of Management and Organization -- In addition to lectures there is a practicum where role-playing situations are utilized.

Methods of Behavioral Sciences -- A basic survey of how man-machine and organizational problems are approached in industrial settings.

Post-Graduate Seminar -- Graduate students are exposed to an intensive individual tutorial program in industrial psychology and sociology with a wide range of required readings.

Obviously, the formal academic program has just gotten underway at Trondheim. During the past year approximately ten students volunteered for each course. With the passing of time, it is anticipated that the courses definitely will be offered on an elective basis for formal credit; and courses in behavioral science ultimately may be required. A number of engineering students have chosen to do their final under-

graduate theses with Marek and he now has two graduate students, both of whom have degrees in engineering. Gradute work in psychology is limited to a degree roughly comparable to the US master's.

Research

Research at the Institute of Psychology and Social Research is more a matter of plans than reality. Marek's orientation to research is identical to that found at the other Trondheim Psychology Institute. Moreover, there is a total overlap in at least one area of interest -- the impact of automation in industry.

Plans are well along to begin a series of studies in regional development, which will become the first active research program area. Of concern here is the devising of procedures or techniques which will facilitate the individual's transition from the traditional role of peasant farmers or fishermen during the industrialization of rural areas. Previous experience in Norway has shown that this transition often is extremely difficult and the rural workers tend both to be "lost" in industrial roles and less productive than their urban counterparts. Marek is approaching this problem with a Tavistock "socio-technical system" orientation, and hopes to maximize production by making organizational and process changes in the factory which will better adapt the technical side of the industry to needs of the workers.

A related project is one concerned both with the development and the control of the tourist industry in Norway. While the tourist industry is a highly important source of income to the Norwegians, there also is a concern that it will over-run the country and spoil the natural beauty. The problem becomes one of identifying the different patterns of tourist interest and behavior, particularly with regard to outdoor activities such as ski-ing and developing facilities which will attract tourists to given areas. This problem will be approached through comparison of successful and unsuccessful tourist areas to identify different patterns of activity and of space utilization.

A final project in the regional development research program will be concerned with problems arising in the transition of the food industry in rural areas from a farmer-consumer relationship to an industrial food conversion and packaging process. Here again, the concept of the socio-technical system will be involved. Thus, it is not enough that a job analysis be made of the various operations required to process the food

and people be hired to fill the positions. In rural Norway the very introduction of food processing or conversion constitutes a changed way of life. Thus, attention must be given to adapting the organizational procedures so that the resulting interpersonal or social organization is such as to increase maximum productivity from workers drawn from a rural, peasant population.

A second major research program area which Marek has outlined for eventual entry is that of consumer research, broadly defined. While his plans and financial commitments are less well structured here than in the rural development program, he hopes to start with studies in the packaging and display of consumer goods. From casual shopping and browsing in Norwegian stores, this appears to be a virtually untouched area. Finally, Marek hopes to continue his previous studies in automation. Here he is particularly interested in changes in the shipbuilding industry.

Summary Comments:

One's initial response to the program of Marek's Institute may well be one of scepticism. In many ways the program outlined above appears to be overly expansive and maybe overly optimistic. Possibly this is true. However, Marek is far from naive in approaching his goals. He has attempted to establish aims for his Institute which are relatively well defined and interrelated. From there he is systematically starting at the beginning. He personally will initiate the studies of rural development, working with a separate graduate student on each project. As soon as the student is capable of taking over one project, Marek will start on the next. He would openly welcome foreign post-doctoral workers, particularly those who speak Norwegian.

The academic or teaching responsibilities of necessity will grow quite slowly because of the problems in expanding the curriculum in an engineering school. Thus, there is ample opportunity to recruit additional faculty members. The University has been quite cooperative and supportive of its new Institute. Space is plentiful, data processing equipment is available, secretarial services adequate (something which is unusual in Europe), and financing adequate. Research funds come from a number of different sources, both state and private. Unfortunately, library facilities are limited.

It will be interesting to see if the enthusiasm and drive of a dedicated and capable docent, coupled with an interest on the part of the University, can offset all of the

negative factors which are brought about by rather extreme geographical and professional isolation.

THE INSTITUTE FOR INDUSTRIAL SOCIAL RESEARCH

The Institute for Industrial Social Research was established in 1958 with funds donated by A/S Freia, a Norwegian chocolate manufacturer. Although the Institute is physically located on the campus of Trondheim University and has access to University facilities, it is a private, nonprofit organization.

The motivating force in both the founding of the Institute and its activity to date has been Einar Thorsrud, who worked as personnel manager for the Freia Corporation before going to Trondheim. The Technical University has provided a natural home for an organization of this nature, as the Institute's primary focus is on research concerned with the relationship of man to industrial processes and the place of the individual in the technological organization. In essence, the Institute is focused on problems beyond human engineering, and thus has a much broader interest than individual man-machine interface. One might even go so far as to say that the classical problems of human engineering really are not a matter of concern to this Institute, even though it is physically located on the ground of a major engineering school.

Organization and Philosophy

Today the Institute for Industrial Social Research is so heavily influenced by and intimately related to the Tavistock Institute in London that it has all the outward appearances of being a branch of the Tavistock, and this is partly in being through collaboration with Tavistock in a major research program. In fact, all that is lacking is the formal affiliation.

On June 1st this year Thorsrud resigned and moved to Oslo, where he is starting a new Institute. This is indeed a blow to the Trondheim group, as he has been an extremely effective administrator as well as a competent investigator. The great void left by his departure may be partially due to the fact that no one else in the organization really concerned themselves with administrative or fund raising details. Thorsrud's successor has not been selected. The over-all direction of the Institute has been placed in the hands of an executive board or council which includes Thorsrud, a representative of the University, and a number of other persons. The research program has been placed under the direction of Dr. Philip G. Herbst, a German trained in both sociology and psychology, who emigrated to Norway via the Tavistock. Daily administrative routines

will be handled by another staff member. The appointment of a new director will be somewhat of a problem as Trondheim is not the most desirable place in Norway to live. Moreover, a foreigner probably would find it difficult to assume the role of front-man with Norwegian industry.

In addition to Herbst, who is fairly well known in Europe, there is one other psychologist, Ad Stemerding, an emigrant from the Netherlands, who took his degree under Mulder. There are five other staff members whose basic degree is in engineering. Supporting staff members are hired as needed from the University student body.

Financially, the Institute is reported to be relatively secure. Money for equipment or related capital expenditure comes from interest on an investment fund set up by A/S Freia. Support for specific projects is obtained from a diversity of sources including the Norwegian National Research Council of Social Sciences.

While the Institute occupies spacious, well-equipped quarters in the imposing main building of the University, there are no laboratories. This stems from the basic philosophy of the group regarding research on industrial organization. Herbst, the present spokesman, expresses the position quite unequivocally. Human behavior in organizations and institutions, by definition, must be studied in a field setting. Experimental social psychology laboratory studies are considered to deal with such artificial, isolated, and restricted phenomena that one well may lose significant insights into the behavioral or organizational situation under study. This does not mean that in rejecting the university laboratory Herbst and his colleagues have rejected theory, experimental rigor, or sophisticated experimental designs. On the contrary, one cannot help but be impressed with their knowledge and understanding of the contemporary scene in social psychology. Their basic argument is with attempts to simulate the reality of an organization through the use of "groups" of university students which have no history and no future. The visitor to the Institute, it should be added, well might detect a somewhat greater interest in the technical or organizational half of the "socio-technical system" approach than in the dynamics or psychology of the individuals involved in the system.

Research Program

Historically, the work of the Institute began with studies of factors which influence the career structure of engineering students, and this research program has continued

to date. The second major program of the Institute over the last three years, carried out in collaboration with the Tavistock Institute, is known as the "Industrial Democracy Project." While these are considered separate programs and are funded from different sources, they actually are highly related. There are plans to start a study in the near future of the merchant marine ship as a 24-hour community. Only the first two major programs will be summarized here.

At this point it might be well to emphasize the highly programmatic nature of the research at this Institute. At present there are only two fully active study areas; however, even by US standards both of these are major undertakings and both involve collaboration with individuals in other countries. In addition to collaboration with the Tavistock Institute in London, there is a well-established working relationship with Professor Louis Davis of the University of California, Berkeley. One obtains the impression that no investigation is undertaken at this Institute unless it is directly related to other outgoing work and also fits into the total programmatic scheme. Thus, each investigation has an antecedent, and it can be anticipated (hopefully) that the results will help in formulating succeeding studies. Perhaps it is unnecessary to dwell upon this point; however, such a highly organized programmatic approach to research is not the general rule in European psychology.

Engineering Education Project

The training or education of engineers is seen as one aspect of a broader problem related to industrial psychology and organizational management rather than a problem of educational psychology. In essence, the purpose of this broad research program might be put as -- "How does one ensure optimal effectiveness of engineers in an industrial organization?"

The research is based on the premise that traditional approaches to recruitment, deployment, and utilization of highly educated personnel in the modern industrial organization are outmoded. So many complex forces related to market demands and/or technical development enter the picture that the traditional task or job analysis and training program requirements seldom have been completed before changes must be introduced. Ultimate progress in this area is considered to depend upon understanding the relationships between basic and professional education, between professional education and practice in industry, and finally between a given job, broad career patterns, and the society in which the individual is living.

A multitude of studies in both Norway and other countries have fed into the educational vector of the research.

Starting with students in the 15-19 years age group, studies have been carried out on the stability of interests as well as the actual process of structuring or focusing the interests of students in Norwegian school systems. It has been found that while interests are relatively stable during this age period -- in terms of broad categories such as science and engineering versus literature -- the emphasis in school appears to be focused primarily towards the short-term goals of passing required examinations. Students tend to postpone seeking relevant vocational information until they have taken the all-important matriculation examination which determines their eligibility for university entrance. On the basis of these studies it was concluded that Norwegian high school students are neither motivated nor guided toward seeking vocational information relevant to their aptitudes and ability for careers in engineering.

Another series of studies has been devoted to the question of how adequately university training in engineering prepares an individual for his subsequent professional life. Included here are investigations of the norms and values predominant among students and faculty members, the effect of university growth on the teaching-learning situation, and time allocated to different study activities. Interestingly enough, it was found that the actual program of study bore no relationship to the formal plan outlined by the university. Not only does a problem exist in actually integrating the basic sciences with laboratory work, but this is further compounded by a difference in student and faculty value systems. While not unique to the Norwegians, it would appear that the students demonstrate far more interest and concern with academic material, laboratory or otherwise, which they believe to be characteristic of engineering as a field of study and as a profession, while the faculty are far more concerned with academic-theoretical problems. At the same time it was found that there is little if any place in the present study program for consideration of the administrative and nonengineering problems which the student will face in industry. When this material is related to findings from studies in industry, it would appear that neither the present selection system for university training in engineering, the training focus, nor value systems of the students and faculty give adequate preparation for a career in engineering and transition from student to professional life. Further, the social and administrative values which characterize industry are largely ignored in the engineering curriculum.

These results might make it appear as though the training at the Technical University of Norway, as well as at the pre-university level, was of poor quality. As a matter of

perspective, this is definitely not true; Trondheim has an excellent reputation as an engineering school. However, it would appear that these studies have disclosed ways in which the training of engineers could be made more commensurate with their long-range career development.

A second broad group of studies has been directed toward obtaining a better understanding of the engineer and his career pattern in industry. To start, the position of engineers in Norwegian industry was analyzed against the context of their educational background and career development. Here a longitudinal study was made of graduates during a ten-year period of time. Approximately 65% of the graduates were employed in private industry and only 30% were employed on purely technical work at the time of the follow-up, a finding which was not necessarily unanticipated. A more important outcome of this study was the discovery that the procedures now employed by Norwegian industry for categorizing or describing activity in engineering are diffuse and grossly inadequate for research purposes. Thus, with such an unclear conceptualization of engineering jobs, a question is raised as to how it is possible to formulate company policy regarding recruitment, deployment, and utilization of engineers.

Other studies, using the case history method, were focused on the question of "What happens when companies advertise for engineers and jobs are filled?" Here, the above diffusion was highlighted. It was found that recruiting was directed microscopically towards specific jobs rather than being conducted within a framework of over-all company function and career development. Of particular significance it was found that the customary recruiting approaches placed the applicant in a conflict position in which he was required to choose between strictly professional activity with limited promotional opportunities or a broader range of field work that encompassed functions for which he was not trained, i.e., sales, research, etc.

This all fits very nicely with research done outside the primary Trondheim group. An example in point are Hertzberg's studies indicating that work content is a primary source of positive motivation in industry, while external work conditions may become the leading source of dissatisfaction. Here the research in the industrial area begins closely to overlap that on personality factors of engineers. Particularly germane at this point are Norwegian studies with regard to conflict of values brought about by discrepancies between the job content and personal value orientation.

The work grossly summarized above has been focused generally on translating the problem which exists into researchable terms. One of the more significant factors to set this broad research program apart from similar studies elsewhere is the possibility of implementing experimental studies which are an outgrowth of the basic or survey phases of the program. There is an excellent relationship with the engineering school, the highly dynamic Norwegian professional engineering societies, and with a number of industries.

Continuing surveys of approximately 20 Norwegian corporations are being made through the Engineering Society to determine structural changes in professional careers over a period of time. In addition, programs have been instituted through the professional societies to supplement formal university education and thus compensate for areas previously neglected in the technological studies. With the cooperation of both Norwegian industry and the labor unions, a series of major investigations have been launched on the effective utilization of professional engineers in large corporations. This work is based on the Tavistock Institute's socio-technical model. The basic goal of the research has been to increase the individual's feeling of participation in and hence satisfaction with vocational activity in industry. It is hypothesized that this, in turn, will lead to an increased level of individual effectiveness in the work situation.

Industrial Democracy Project

The second broad research area of the Institute for Industrial Social Research is known as the "Industrial Democracy Project." This began in 1962 at the joint request of the Norwegian Federation of Employers and the Trade Union Congress, both of whom contribute to the financial support of the projected ten-year effort. The idea for the project was first proposed by Mr. Olav Bruvik, the late Norwegian Minister of Social Affairs, and it would appear that there were both political and reality factors behind its establishment. The political factors were concerned with broad issues of social democracy in Norway and reality factors were an outgrowth of the realization that Norwegian industries must capitalize upon the potential of their workers to help compensate for the economic handicaps resulting from the country's limited natural resources.

The objective of the study, translated directly from the Norwegian, is "Under what conditions can more rights and responsibilities be achieved for the individual in the work-place?" On the basis of rather extensive discussions with the investigators, it would appear that a somewhat more lucid

translation of the goals would be to determine the conditions under which the individual is given greater control over his own particular job task or function and at the same time assume greater responsibility in the industrial organization where he is employed.

The Industrial Democracy Project is divided into two distinct phases. The first, which required approximately three years to complete, provided the background for the actual experiments which now are being carried out in the second phase of the program.[3] A voluminous report on phase A has been published in Norwegian, and an English translation of this monograph recently has been undertaken. Work on phase B of the project, the experimental phase, is still under way.

The work commenced with a systematic search of popular and technical literature in an effort to define and understand the concept of industrial democracy as it is currently used in Norway. This proved to be exceedingly difficult as it would appear that there is no universally accepted formulation of the concept. Remembering that Norway is a socialistic country, fiercely concerned with democracy and individual rights, it is not surprising that the concept carries certain philosophical and political-economic connotations. At the same time it carries an equally strong -- possibly even stronger -- connotation of optimizing the productivity and efficiency of industrial organizations. The concept has been used to describe the formal representation of labor in company management schemes, and it has also been applied to the conditions of job structure and task organization in which the individual worker participates in the broader industrial setting.

Next, an extensive investigation was made of formal employee representation in the management framework of Norwegian industry. The literature reporting similar work in Yugoslavia, West Germany, and Great Britain also was analyzed. While it was recognized that the findings from other countries could not be generalized to Norwegian industry, they do provide a broader background context in which to evaluate the more detailed Norwegian studies.

The study of employee representation on Norwegian management boards was made with the cooperation of a joint

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[3] Fred Emery and Einar Thorsrud, "Industrielt demokrati-representasjon På styreplan i Eedriftene?", Oslo University Press, 1964

management - trade union committee which selected four corporations for study. Following a rather comprehensive interview schedule, data were collected both from representatives from the executive or management side of the board and from employees who had served as board members. In all 30 people, including the managing director and a minimum of two or three persons in each corporation with leading roles on the board, were interviewed. The remainder of the subjects were employee representatives to the board. In the case of management personnel, two or three members of the research staff were present at the interview and all took notes which later were combined and condensed into a single written report. The employee interviews were recorded on tape and transcribed verbatim. In every case the interview schedule was rather closely adhered to, at times necessitating more than one meeting with a given individual. In addition, information was available from the written records of formal board meetings. The monograph on the first phase of the Industrial Democracy Project presents a detailed analysis of the interview and management record data. This report is quite penetrating and very lucidly presents the problems which characterize employee representation on industrial corporation boards.

Although the findings are too lengthy to summarize here, the data very clearly indicate that employee representation on Norwegian management boards is not an effective means of accomplishing the goals toward which the Industrial Democracy Project is directed. An employee may overcome the social-psychological problems of being the outsider in a group with different socio-economic backgrounds, value systems, and perceptual sets within a period of one or two years. However, the reality constraints imposed by the industrial and financial aspects of management often are in sufficient objective conflict with worker goals so as to minimize the impact of employee participation. Likewise, the results of the foreign studies which were reviewed indicated that the worker participation in industrial management boards did not in a single case serve the purpose for which it was intended.

A number of mechanisms for enhancing communications between the employees and management and hence solving many internal corporation problems became apparent during the study. At the same time, however, it was evident that neither these mechanisms nor the representational systems have the degree of influence desired on the over-all efficiency of the organization. If "industrial democracy" employee participation in management is to become meaningful, it must occur at a level at which large numbers of employees are both able and willing to participate. In essence this dictates shifting attention from

the board level to individual jobs. The notion here is to devise conditions which both change the worker's perception of his job and increase the degree of control which he is able to exercise over his individual work situation. Thus, one comes back to the basic Tavistock socio-technical theoretical model to which the Trondheim Institute is dedicated.

Phase B of the study is concerned with actual experimental attempts to create conditions under which workers have an increased degree of control and responsibility in the job situation. The strategy is basically twofold: job enlargement through a systematic task analysis; and, reorganization of task functions so as to develop autonomous working groups. In essence, the studies in phase B are concerned with job design and development of new jobs. One experiment has been completed in the wire-drawing section of a Norwegian metal industry and a second currently is under way in a pulp and paper factory.

The wire-drawing section of the metal factory was selected for study after long and extensive union-management discussions. In this particular department there is no inter-dependence between workers, each man has his own workbench, and he has no responsibility for production activity aside from his own job. There is little social interaction with workers except for infrequent contact with machine maintenance men. At times, because of breakdowns or delays along the production line, a particular worker will be practically inactive. Pay is on a basis of productivity, although a standard rate is used when the machine is not operating.

A carefully drawn-up experimental design was formulated for the study whereby men would work in groups of four and each group would be responsible for the functioning of seven machines. Two shifts of workers participated so as to provide replication. Output and earnings of the preceding ten weeks were taken as a baseline measure of productivity.

In spite of the cooperation which the unions had given to embarking upon this project, they refused to cooperate with the experimental design as formulated. First the union insisted that the seven workbenches chosen for the experiment should be manned by at least six men rather than the four which were desired by the investigators. In addition, many of the workers were poorly motivated at the start of the study and were passive participants at best.

Within a matter of days the study became plagued with difficulty because of a concern on the part of the workers over being viewed by their fellow union members as "rate breakers" and

because of the fact that the men did not feel comfortable working in the group situation. After four weeks it was halted, two groups of genuine volunteers were assembled, and another try was made to collect data. To a certain extent the problem of incentive was resolved through discussions with the union. However, the conditions of optimal manning were not fulfilled except for one brief period when a worker was absent. In fact, there was only one brief period, in one group, where the experimental conditions were even close to being fulfilled. Productivity clearly was increased in this situation. For the most part, however, productivity was lower during the experimental than during the base-line period.

If the results of the wire-drawing department study were considered to be a crucial test of the Trondheim group's theoretical position, one might rapidly lose interest in the work. In reviewing the data and the sequence of events which transpired during the study, it becomes abundantly evident that one can draw few conclusions since the experiment never actually got off the ground. In fact, this might well be considered one of those cases where an experiment contributes more to the education of the investigators than it does to advancing scientific knowledge.

Months of negotiation had gone into laying the ground for the study. It had the support of both management and the union in the particular factory where it was carried out. In fact, as mentioned earlier, this work was undertaken at the request of and was financed by a Norwegian labor-management group. It is hard to imagine more ideal conditions for undertaking field work of this nature. At the same time, and in spite of the progressive and supportive attitude of the sponsors at the abstract level, implementation of the research was a different matter. It would appear as if the entire experimental procedure was neither fully comprehended nor accepted by the lower-level employees for whom it was designed to assist. One obtains the impression that the experiment struck at the very core of the industrial or union tradition and value system of the shop employees. Moreover, it would appear that union mores and traditions are far more firmly entrenched among some highly-skilled Norwegian workers than the investigators, management, or even the union leaders imagined.

The usual consequence of a situation of this nature is to terminate the study. Such was not the case here. It would appear that Thorsrud and his colleagues had established sufficient rapport with the sponsors to retain their interest and capitalize upon their positive motivation. Thus, the experience was used as a basis of discussion for future

experiments and changes within the factory.

Studies which essentially duplicate that described above now are under way both in an Oslo paper factory and a steel plant in Kristiansand. Profiting from the experience in the first wire-drawing department experience, these have not collapsed. However, it is too early to draw conclusions from the data.

SUMMARY COMMENTS

It is difficult to spend any length of time with the Trondheim groups without becoming at least mildly infected with their optimism, enthusiasm, and broad theoretical position. On occasion one might have a fleeting thought that they are biting off more than they can chew and do not have the proper resources to undertake studies of the magnitude and scope which characterize their present research. Also, one might wish to see more fully trained investigators engaged in the work. To a large extent, however, these concerns are offset by the close collaboration which has been established with the Tavistock group in London.

A more serious concern is a somewhat vague feeling (possibly unwarranted) that there may be a tendency to interpret and generalize beyond the limits of their data. Moreover, while much of the work discussed above has been written, it might be desirable if there were fewer mimeographed reports and more publication in the technical literature. One also wonders how long the two Institutes will be able to justify their existence as separate organizations in a small and professionally isolated setting.

Foreigners, particularly Americans, might be taken aback by the aura of idealism or "cause" which on first contact appears to surround the concept of industrial democracy. However, upon reflection, it would seem that much of the emphasis placed on the concept per se is dictated by grantsmanship and the prevailing tenor of the Norwegian industrial community. The actual research of the Trondheim groups easily can stand on its own merits in the areas of industrial and social psychology. In fact, it may be the very flexibility inherent in the Norwegian attitude of industrial democracy which will permit the modification of traditional labor and management positions necessary to carry out the type of research with which the Trondheim Institutes are concerned.

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Summary of organizational and current research activity at the Institute of Psychology and Social Research and the Institute for Industrial Social Research at Trondheim, Norway.

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TECHNICAL REPORT
ONRL-48-66

MILITARY PSYCHOLOGY IN NORWAY

BY

JOHN E. RASMUSSEN

7 December 1966

MILITARY PSYCHOLOGY IN NORWAY

As in the other Scandinavian countries, military psychology in Norway is centralized in a joint or tri-service institute, the Norwegian Military Forces Psychology Service (Forsvarets Psykologiske Avdeling, Sannergaten 14, Oslo). This group (FPT) probably has the longest history of any of the Scandinavian psychology organizations, and at the same time it also would appear to have experienced the greatest amount of difficulties, upheavals, reorganizations, etc., with the passing of time.

FPT actually can trace its beginnings to 1943, when the Norwegian Government in exile was headquartered in London. At that time plans were laid for the establishment of an office to conduct a psychological selection program for personnel to be conscripted into the Norwegian services after the war. The office was established, as planned, after Norway was freed from German occupation at the end of the war. Since its inception FPT has been a part of the centralized Norwegian forces, even though the name has been changed several times with reorganizations.

Military psychology in Norway has always been an in-service, as opposed to university contract, program. During the late forties and early fifties there was little activity other than the screening of young men eligible for the Norwegian universal conscription or draft service. However, during the 1950's both the Navy and Air Force developed independent programs. The Navy program, which was almost wholly of a clinical-social psychology nature, was rather unusually successful and is briefly described in ONRL report 46-66.

The development of separate in-service psychology groups by the Navy and Air Force, which included psychologists in uniform, posed a rather severe setback for the central Department of Defence program. Because of the controversy, confusion, etc., which grew out of the development of separate programs, an inquiry into the organization and structure of military psychology was instituted in 1961. Following a year-long and rather intensive study of the three military psychology programs and the needs of the service, a rather extensive and voluminous report was issued in 1962. While there were a number of other factors involved, it would appear that this report resulted in a reorganization, when the Navy and Air Force programs were terminated, and all psychology was again focused in the revitalized and strengthened central Forces Military Psychology Service. As in the case of all struggles of this nature, the conflict between the individual services and the central organization

definitely took its toll. In fact, the scars of this power struggle clearly are evident even today in Norwegian military psychology, and it is probable that evidence of the conflict will persist in a number of ways for several years to come.

At present the Norwegian Military Psychology program is headed by Candidate Psychologist Rolf Gerhardt. Gerhardt is an interesting person who might easily be underestimated. His basic training is as an athletic coach at the secondary school or gymnasium level, and he is still very much sports-minded. Gerhardt was in the Norwegian Army at the time of the German invasion in 1939. After demobilization, early in the German occupation, he taught school in central Norway. However, at the same time he was a leader in the Norwegian Underground movement and served for a year as an intelligence officer. He was arrested by the Germans in 1943 and spent the remainder of the war in prison. Following the liberation of Norway, Gerhardt finished the five-year psychology program at Copenhagen University in three years. He then returned to Norway, and has been associated with the military psychology program since the early fifties. In 1958 he became director of the FPT and has retained this position until the present time.

As is the case of many Scandinavian psychologists, Gerhardt has not seriously considered finishing a dissertation for the PhD degree because he does not expect to become chairman of a Psychology Department -- the only position in Scandinavia which really requires the doctorate. At the same time, Gerhardt's interest, ability, and originality in basic research is something that would not be suspected on superficial contact. The nature of Gerhardt's present research interests and activities, which are only tangentially related to military psychology, will be summarized subsequently.

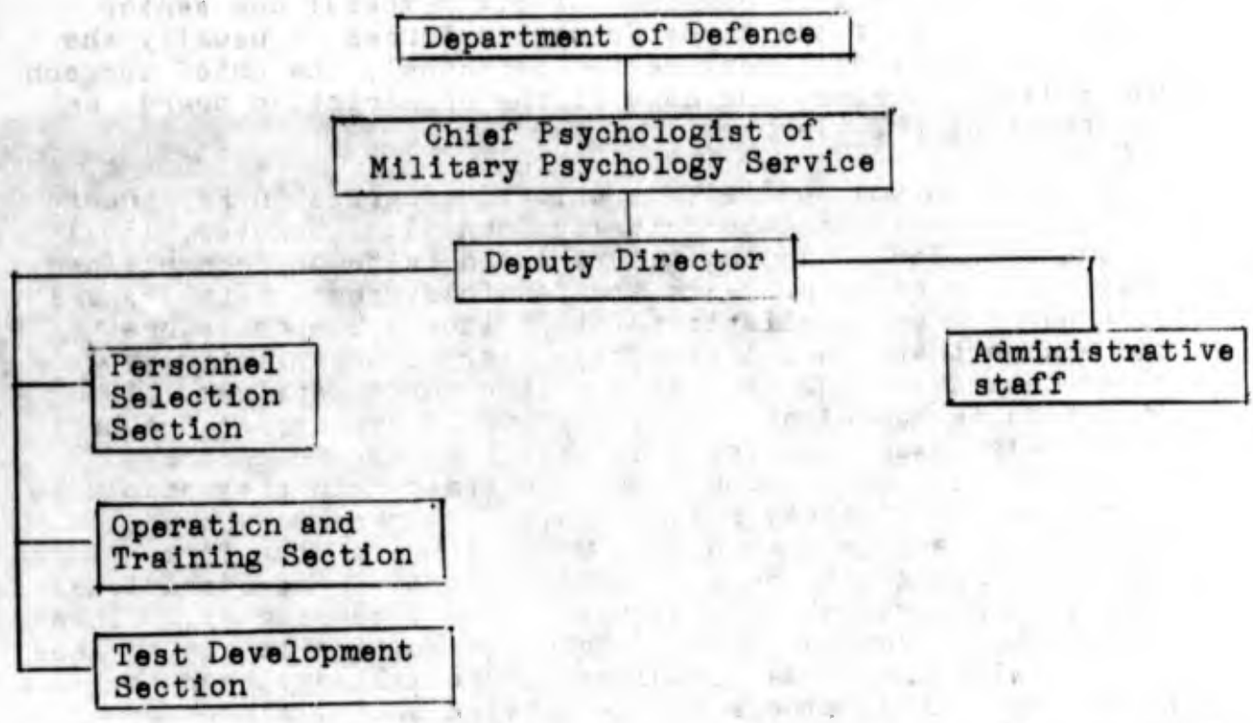
Without belaboring the nature of the difficulties experienced by the Norwegian military psychology group over the past ten years, which have centered largely around intraprofessional rivalries, the remainder of this report will be concerned with the present organization, goals, and program of the Military Psychology Service.

At present FPT is directly responsible to the senior personnel officer of the Norwegian Department of Defence. Gerhardt occupies a position as the "professional authority" in psychology for the Department of Defence and thus has essentially the final word in all matters pertaining to military psychology. In spite of his occupying this position, there is also a Military Psychology Institute Council which is responsible for determining the priority of applied work and/or research in the Norwegian

forces. The Council is composed of six members: one senior officer from each of the three Norwegian forces -- usually the chief of the individual service for personnel, the chief surgeon of the military forces, the head of the conscription board, and the director of FPT (Gerhardt).

Research and applied operational programs in FPT theoretically originate with the Priority Council. However, in all cases the decision as to how the research is to be accomplished, as well as to whether projects are feasible, rests with Gerhardt. Considered from an idealistic point of view, this procedure should ensure that the military psychology program is fully directed toward serving the needs of the three services. In reality this is not always true. It would appear, on the basis of relatively casual observation, that the members of the Priority Council are somewhat less concerned than they should be with problems of military psychology. The general who until recently had been chairman of the Council was of the firm opinion that all decisions with regard to the nature of the operational and research program should be made by the psychologist. This philosophy has resulted in the Psychology Service being far less in contact with the actual problems of the military than they might desire. All members of the service staff, eleven professional persons at the present time, are civilians and have far less daily contact than might be desired with key personnel in the operating forces. Recently leadership of the Priority Council has changed, and it appears as if there will be greater participation of the military services in guiding the work of the Institute. Nevertheless, at the present time the board actually operates somewhat as a rubber stamp and does nothing more than review the FPT program four times a year.

The organization of the Institute is set forth in the following diagram:



At present 16 professional positions are authorized and eleven of these jobs are filled. There has been a rather unusually serious problem of recruiting psychologists for any job, either civilian or military, in Norway over the past two or three years. At no time has the Military Psychology Service been able to fill all of its vacant positions, although this situation should change in the coming summer. This year Oslo University is graduating approximately eight times the number of psychologists -- trained roughly to the equivalent of the American PhD level -- as has been true over the past few years. However, all able-bodied males in this group will be required to serve in the armed forces as conscripts. Present plans call for six of the outstanding male graduates to be assigned to the Military Psychology Institute. This change in the size of the staff should have a noticeable impact on the productivity of the Institute. All of the conscripts assigned to the Institute will serve as commissioned officers and be required to complete 16 months of active duty. It is anticipated that a number of these individuals will remain with FPT in a civilian capacity following completion of their military service.

There is little systematic research now under way at FPT; in fact, the one sophisticated basic program is that being carried out by Gerhardt himself. The shortage of personnel and demand for applied services reportedly preclude any large-scale

research activity. However, one also gets the impression that the present staff of the Institute are not primarily research oriented. The Institute has its own series of military psychology reports in which research studies are published in the Norwegian language. A few of the studies have English summaries. One very concrete indication of the current lack of research activity is the fact that the last report in this series was published in 1963.

As indicated in the above diagram, the professional staff has been divided into three sections, each of which is headed by a formally appointed leader. The activity of the Institute will be summarized by section, although it should be noted that in reality there seems to be a rather remarkable lack of structure and crossing of interests which leads one to wonder if the sections have a meaningful function.

The Test Development Section is headed by Per Frivik. This Section has responsibilities for the development and validation of test instruments or batteries which will actually be applied by other sections of the Institute. Thus, in one sense Frivik's Section is the most basic and research oriented of the whole Institute. Frivik is a relatively young man who received his training at the University of Oslo. He has been with FPT for about six years, although his appointment as section head dates from January of this year. While not trained in clinical psychology, he has an interest in behavior therapy, and hopes to initiate a project in the foreseeable future concerned with the treatment of neurotics.

The Test Development Section was responsible for the present battery of psychological tests used in screening conscripts. However, no work has been done since 1956 in revising these tests or assessing their effectiveness. The need for a revision of the battery is recognized, and work in this area is planned as soon as additional personnel become available. The present battery is basically concerned with assessing intelligence. It is planned to add an electronic aptitude test and an interest inventory when the battery is revised. Further, it is hoped to develop a brief intelligence test which can be used as a rough screening instrument with conscripts. In this way those candidates for conscription who are grossly retarded may be identified without having to go through the whole battery. The final disposition of such cases is made on the basis of individual examination.

Frivik's primary activity at the present time is concerned with developing a selection battery for guided missile operators who will use ENTAC missiles. At the present time

groups of high level conscripts are placed in platoons of about 35 men and form complete missile teams. The men are all observed on a simulator where they receive preliminary training in firing rockets. Using an undefined "common sense" approach, the four potentially best men are selected to attend a school for guided missle operators, and a second group of four men are selected as alternates. The whole platoon enters into training, with the remainder of the men driving trucks, etc. Through observation and trial and error, the best men in the platoon (who may or may not be the original four) finally are selected and specially trained to fire missiles. Reportedly, the system has been highly effective in the past and the quality of the men ultimately selected as missile operators has been excellent. On the other hand, the system is considered wasteful, as approximately 30 of the 35 men will never fire missiles.

Inasmuch as only relatively high-level recruits are assigned to these platoons, it is considered that there is a great manpower loss when individuals in this group are assigned to driving trucks or jeeps, and to other minor supporting details. Accordingly, it is desired to develop a psychological test battery which will identify effective missile operators prior to training and permit the use of lower level personnel for supporting jobs. An interesting situation is posed by the task which Frivik faces. He has been asked to develop a psychological test battery which will be used to replace a system which now produces extremely accurate results. Thus, he cannot hope to improve upon the present accuracy in selecting missile operators. Frivik has started work on his selection battery. This research has received considerable impetus from NATO, as apparently no entirely satisfactory program exists in any country for training ENTAC guided missile operators. Representatives from Great Britain, Denmark, Germany, Italy, and France have been meeting periodically to exchange ideas and information on the development of a selection program. While the Netherlands and Norway are not actually participating, they do attend the meetings as observers.

At present it is planned that the selection battery will be composed of four tests. The first is a mirror-drawing test, designed to assess visual-motor coordination, in which the individual is required to follow an electrically-sensitive trace with a stylus. Time on the trace, accuracy, and total time of the test is recorded automatically.

The second test of the experimental battery is a rather deceivingly complex modification of an old German speed test. The subject is presented with a box which measures approximately one square foot and contains a total of nine

holes, symmetrically arranged in three rows, each containing three holes. The rows are numbered from one to three at the side of the box. Each hole is surrounded by a colored ring, red, green, yellow, or blue. A color name is printed above each hole, but the name and the color of the surrounding ring may or may not be matched. Instructions for the test are given by a tape recorder. The subject is required to put colored pellets in one or another hole as indicated by the taped instructions. For example, he may be instructed to place a red pellet in the red-colored circle in the second line, a green pellet in the hole labeled green in the first line, etc. The speed of the instruction is increased to a point where it is impossible for the subject to comply. While the task is fairly simple at the beginning, it becomes extremely difficult as the speed is increased.

The third section of the battery is a time perception test. Here a tape recorder presents time intervals ranging in duration from five to 25 seconds. The intervals are filled with different constant sounds. Further, in order to prevent the subjects from simply counting as a means of keeping track of the time interval, a simple distraction is introduced in the form of adding or subtracting numbers. In this test the subject responds by estimating the number of seconds in each interval. The length of the intervals is varied in a random manner. Finally, the battery will include a simple cancellation test.

To date, the sorting test has been constructed and preliminary studies are being made of its use. The time perception test has been planned in detail although it has not yet been put on tape. The other two tests have been used previously and will be employed here without modification. It is rather interesting that each of the NATO psychology groups working on this problem apparently is developing its own individual test battery. While there is reported to be a general consensus that the abilities tapped by this test battery probably are related to success as a guided missile operator, validation definitely will constitute a problem. Because of the expense, guided missile operators in any country are given little occasion to actually fire the missile in practice. This makes it difficult to assess performance. The validation difficulties will be compounded in the case of the Norwegians, as so few men are trained in this specialty that it will be difficult to obtain a large enough sample for meaningful statistical treatment.

The Operation and Training Section. Erik Riis, who at one time directed a psychology program for the Norwegian

Air Force, is head of the Operation and Training Section. Possibly because of Riis' background and interest in the Air Force, most of the work of this section is done for that branch of the service. Riis has a very small staff at the present time, and the work of his section is almost exclusively applied. There have been some limited or abortive approaches to research within the past few years, although the section is clearly not research oriented at present.

It would appear that Riis and his colleagues are quite well accepted both by Air Force line officers and the medical department. His staff sit as members of the Flying Board, where they evaluate pilots for suitability to continue in a flying status, review all accident reports, and play a heavy role in the selection of personnel. A great deal of their time is spent dealing with transfer of training problems when pilots change from one type of aircraft to another. No formal studies are carried out to develop training programs for new aircraft because of the small number of pilots involved. However, an analysis is made of differences between aircraft through observing operational procedures. These differences are then discussed with the pilots in terms of habit pattern interference, etc. Reportedly, these discussions, even though time-consuming, are well received by the pilots. In this regard it would appear as if the psychologist with the Norwegian Air Force acts in a role which is very much analogous to that of a flight surgeon. However, the focus of the psychologist centers on problems of training, human engineering, etc.

Recently Riis' section completed a survey of adjustment problems in underground radar command posts. Through interviewing all individuals assigned to this type of duty, it was concluded that the primary cause of interpersonal difficulties and ineffectiveness in these commands was faulty personnel assignment. Apparently there has been little or no selection for this type of duty, and through an unplanned chain of circumstances large pools of men rejected for other types of service were assembled. It was found possible to make recommendations leading to correction of the situation without a formal research effort.

This section also provides consultants to the various military training schools and their duty in this sphere is quite diverse and varied. First, courses are run periodically for officers who are assigned to military training schools. An effort is made in the courses to convey the basic principles of instruction, learning, measurement of achievement, and other aspects of educational psychology. The psychologists also assist in the development and standardization of achievement

tests for the various service school curricula. In this work an effort is made to determine the specific aspects of performance which are important on the job; although it would appear that little, if any, formal research is involved. Finally, an attempt has been made to develop a system of standard scores for rating a man from the diverse schools so that there is a single service-wide frame of reference in grading service school achievement.

A final activity of the Training Section program is lecturing on the psychology of leadership to cadets at the service academies. Each student at the Army and Air Force Academies receives approximately 100 hours of formal lectures in psychology. A midshipman at the Naval Academy receives approximately 20 hours. The discrepancy in time between the Academies is explained on the basis of geographical proximity. The Army and Air Force Academies are convenient to Oslo, while the Naval Academy is on the opposite side of Norway, in Bergen.

The Selection and Classification Section, headed by Cand. Psych. John Syversen, is the largest group of FPT. Syversen is responsible for all selection and classification procedures in the Norwegian Defence Forces.

Every Norwegian male is required to take a preliminary battery of psychological tests at the age of eighteen. These tests are constructed by FPT; however, the Central Conscription Office of the Department of Defence is responsible for their administration. Syversen trains the individuals who administer and score the tests; and, when requested, acts as a consultant on the use of the battery.

The basic test battery is divided into three sections. The first, general ability, consists of a vocabulary, progressive matrices, and arithmetic reasoning test. The second, technical comprehension, includes a modification of the Bennett Mechanical Ability and the Guildford Spatial Perception tests. The third section, numerical facility, primarily is a simple arithmetic test. The scores are transposed to a Stanine scale, with five as the mean and nine as the high score.

As indicated in ONRL report ONRL-46-66, on Military Psychiatry in Norway, a rather unusual situation exists with regard to assigning men in the forces. All conscripts who have worked in the Merchant Marine automatically receive an assignment to the Navy. In spite of the size of the Norwegian Merchant Marine (the third largest in the world), men drawn into this occupation tend to be those who have difficulty adjusting at home or in other lines of work. This increases

the proportion of maladjusted people received by the Navy, and has resulted in a special selection program which is not used for the other two services. All men entering the Navy are individually interviewed by a psychologist and complete additional biographical inventory forms. Men entering the Army and Air Force are not interviewed by the psychologist unless they are referred by training officers. The referral to the psychologist is made through the local unit medical officer.

When men actually enter service a year after their initial testing, they are assigned to schools and military duty on the basis of initial test battery scores, civilian education, occupation, and interest. However, special tests have been developed in the case of certain service schools.

The shortage of personnel in the military psychology program has worked an extreme hardship on the Norwegian forces. The special Navy program of screening and selection is carried out as far as possible, although not to the degree which was envisioned when it was established.

FPT also is quite active in pilot selection for the Norwegian Air Force. Reportedly, there is an extremely large manpower pool from which relatively few aviation cadets are selected. The selection battery used for this purpose is made up of a pattern analysis test based on the Raven progressive matrices; an arithmetic reasoning test constructed by FPT; a modification of the Bennett Mechanical Comprehension Test; U.S. Army Air Force instrument comprehension and dial reading test; a complicated "instruction" test developed by FPT; a modification of the Minnesota Paper Formboard; and a general information test constructed by FPT. This battery has not been revised since the early fifties and the latest study on its validation was reported by Syversen in 1960[1]. This study was limited to a group of 164 pilots who actually finished flight training. Two factors isolated from the battery, combined with high school marks, correlated (0.66 and 0.58) with performance in operational flying.

Because of the shortage of psychologists at FPT, the high selection ratio, and the empirical effectiveness of the

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[1]Syversen, J.L., Psychological Selection of Fighter Pilots, II, Militaerpsykologiske Meddelelse, Nr. F-5, 1960. Defense Psychology Service, Oslo

program, there has been little pressure to update the test battery, even though it is some 15 years old. At present, approximately 55%-60% of applications for pilot training are disqualified on the basis of the psychological selection battery. All men accepted undergo a short 24- or 25-hour period of pre-flight training. An additional 39% of the applications are disqualified in this pre-training procedure. However, less than 10% of the applicants who enter formal flight training fail to be graduated.

There is a rather noticeable absence of follow-up studies in Syversen's section to determine current rejection rates and attrition rates of Army, Navy, and Air Force recruits. In fact, from a discussion with Department of Defence statisticians and an examination of their reports, it would appear as if their data is not in such a form as to permit detailed statistical studies of recruit attrition. There is a definite awareness of the need for research in support of an applied selection program, but there also appears to be a general attitude of frustration with regard to any attempts to initiate such research.

The primary research activity under way at the present time, with the exception of the work in Frivik's section which was summarized above, is the long-term project being carried out by Gerhardt himself. For many years Gerhardt has been interested in perceptual, motor, and behavioral problems associated with left-handedness. Approximately ten years ago, because of the observation that left-handed Norwegian Air Force pilots were referred to psychologists three times as frequently as right-handed pilots, Gerhardt instituted a series of studies on perceptual and motor differences associated with left-handedness. After a series of interesting although not particularly significant studies, he began a rather intriguing series of basic investigations in visual perception which have continued now for almost ten years. None of this more recent work has been published, although a great deal of the data has been written up within the past several months; and a series of papers, first in Norwegian and later in English, should appear in the immediate future.

While the direct impetus for this work was an interest in left-handedness, over a period of time the research has evolved into basic studies of visual perception per se.

This work began with an attempt by Gerhardt to develop techniques for the selection of recruits to be trained as military truck drivers. Using a Dolman apparatus to assess

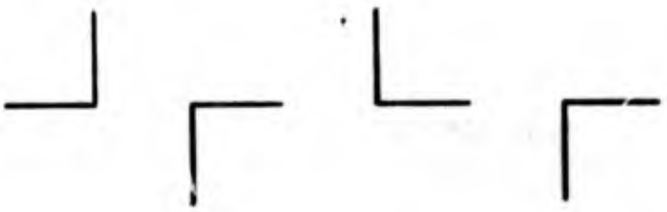
depth perception, Gerhardt noticed that his subjects consistently fell into two primary categories. One group consistently overestimated the distance in responding to the stimulus marker (+ group) and the second consistently underestimated the distance (- group). Moreover, highly consistent relationships were found between both the distance of the subject from the stimulus marker, magnitude of the error of judgment, and the direction in which the error occurred.

Judging the distance of the stimulus marker from the reference point, the minus error group proved to be consistently better when the stimulus marker was going beyond the reference point, and the plus error group proved uniformly more accurate in estimating the distance as the marker approached the reference point from the side nearest the subject. This raises a question as to whether the subjects making a plus-type error might not be far more accurate in making distance and speed judgments in driving automobiles or flying airplanes.

The above findings held with replication when the subjects were required to adjust the distance marker themselves. However, when the apparatus was modified so that the investigator adjusted the apparatus and the subject's response was verbal in nature, the differences between the plus and minus groups were completely eliminated. This leads Gerhardt to the rather obvious conclusion that the differences may be attributed to different perceptual motor integration for the two groups of subjects.

In another experiment an additional difference was obtained which differentiates the two groups of subjects. Instead of being requested to place the markers at an equal distance in the Dolman apparatus, the subjects were requested to estimate the distance between markers on a series of predetermined settings. Here the subjects who made the plus-type error on the original experiments were found to be quite stable in the magnitude of their error of judgment. On the other hand, subjects in the minus group tended to be erratic and unstable.

This work led Gerhardt to a further series of studies relating the influence of vertical-horizontal plane orientation on magnitude of perceptual illusion. In this work Gerhardt used a series of symbols such as set forth below:



First, in asking subjects to simply estimate the difference in centimeters between the two stimulus lines in each figure, Gerhardt found that the magnitude of perceptual symmetry in the symbols was highly dependent on whether judgment was required in a horizontal or a vertical plane. In fact, accuracy of judgment was found "without exception" to be negatively correlated for the two planes. Moreover, the negative correlations obtained were highly significant, being of the magnitude of 0.80.

Response in this situation was quantified through a ratio of lengths in centimeters: $\frac{V}{H} = X$. The score X obtained in this ratio permitted a comparison of the magnitude of illusion created by presenting the same symbol in four different positions in the vertical-horizontal plane. Vertical-horizontal asymmetry was determined from the following formulae; in the vertical plane:

$$(1) \quad Vx_r - Vx_l \ ,$$

for the horizontal axis:

$$(2) \quad Hx_r - Hx_l \ .$$

Asymmetry was uniformly and consistently found to be greatest when the length of the lines was judged with reference to the vertical plane. Moreover, the strongest illusion is created by symbol (4) where the reference line is pointed down.

When the subjects used in the study of vertical and horizontal asymmetry were tested for depth perception a highly significant correlation was found between the magnitude of illusion and accuracy of depth perception. This finding holds regardless of whether the subjects make a plus or minus error in their setting of the Dolman apparatus. This led Gerhardt to conclude that there must be some relationship between sensitivity to illusionary material and accuracy of depth perception.

Gerhardt next turned to a sequence of studies employing

a different type of stimulus material. Here he used the illusionary figures employed by Schafer and Murphy[2]. In fact, no work with these figures is still continuing. The stimulus materials are roughly illustrated below:

FIG. 1

FIG. 2

In the first study Figure 1 was presented twenty times, in a counterbalanced order which alternated the profile line dividing E and Y in the vertical plane. In this case, Gerhardt's subjects responded by perceiving the E and Y half of the profiles with equal frequency. However, when the presentation of the same figure was repeated with the profile line on the horizontal axis, every subject except one tested to date on this stimulus material has responded to the E rather than the Y half of the profile. Figure 2 apparently is not as strong an illusion and fails to give the same results. However, there is a highly consistent, but as yet unexplained, finding with this figure in that individuals who make the plus type of error on the Dolman apparatus prefer the right or O profile and those who make the minus error recognize the A or left profile.

The above comments represent only the grossest and most superficial summary of Gerhardt's work. On the basis of a three-hour discussion, one cannot help but be impressed with the meticulous care, experimental precision and originality of his work. Most of his studies have been replicated at least once, if not more often, so the findings reported above would appear to hold with replication. The number of subjects used in each experiment ranges from roughly 16 to 100. Further, it would appear

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[2]Schafer, R. and Murphy, G: The Role of Autism in a Visual Figure-Ground Relationship, Jour. Exper. Psych. 32, 335-344 (1943)

that most of the obvious pitfalls such as practice effect, variations in experimental procedure, etc., had been successfully avoided. To date Gerhardt has made no attempt to utilize the findings of his basic research in the more applied missions of FPT.

SUMMARY AND GENERAL IMPRESSIONS

Military psychology in Norway presents a series of interesting contrasts and possible lessons for other countries. This is particularly true when the present-day program is considered in a historical perspective. The effect of the conflict and turmoil which has marked Norwegian military psychology over the years clearly is apparent. At the beginning all psychological activity was integrated into a single tri-service organization, as it is at the present time. During an interval in the fifties, both the Navy and the Air Force had a group of psychologists in uniform -- at least two of whom now work for FPT as civilians. It is interesting to note that the greatest advances in Norwegian military psychology appear to be made when psychologists work closely with the individual services rather than in a central organization. Of particular importance here is the Navy selection program, the development of which probably represents the most systematic as well as productive research which has been undertaken in Norwegian military psychology.

At present the climate for psychology in the Norwegian military forces is ideal. However, the psychologists are somewhat concerned about what role they may best fill with their limited resources, and the military "users" of psychology also express subtle comments indicating that they are not receiving the psychological support they desire. The combination of centralization and total lack of uniformed personnel may have resulted in FPT losing close contact with the "users" it was intended to serve.

The inability to recruit personnel is a problem of major proportions. However, one senses that this may be a problem which extends beyond any pay differentials between civilian and government employment and it well may be a function of the present-day program. To date, the work of the organization is limited primarily to routine consultation. The minimal research which is under way on military programs appears to be reasonably sound but quite routine. The only work which is really exciting is that of Gerhardt, and this is not directly related to his role in FPT or to the organization.

The addition of six staff members in the form of psychologists who will serve their required military service at FPT may do something to renew the organization. Several of the conscript psychologists will be trained in the clinical area, and plans already have been made with the Central Defence Medical Department for their use in a clinical role. Possibly the additional manpower and the renewed contacts with the military service will serve to enhance the vitality of the organization.

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MILITARY PSYCHOLOGY IN THE NETHERLANDS 1967

JOHN E. RASMUSSEN

16 JUNE 1967

UNITED STATES OF AMERICA

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MILITARY PSYCHOLOGY IN THE NETHERLANDS 1967

INTRODUCTION

As in the case of many countries occupied by Germany during World War II, the roots of present-day Dutch military psychology may be traced to Great Britain. During the period 1944-45, plans were made by Dutchmen exiled in Great Britain for the establishment of a formal military psychology program in Holland at the end of the war. In 1945 a formal Psychology Department was established in the Dutch Army by Professor De Graaf. At that time the Air Force was part of the Army, and the Navy had a small selection board with one psychologist, Drs* Ch. J. de Wolff, and two officers. In 1945 Captain D. Langelaar, present head of the Navy program, joined the Army psychology group. In 1952 a change in Army senior commanders resulted in a gradual constriction of the Army program, and Langelaar left in 1955 to join the Navy Selection Board Office.

The Navy psychology program was established on a large scale in 1961 with Langelaar and three other uniformed psychologists. The Air Force program began in 1951 under Dr. S.D. Fokkema, who is now a professor at the Free University of Amsterdam. At the present time the three service programs differ rather drastically in terms of scope, magnitude, and sophistication of effort.

For its size the Netherlands maintains a rather large military force. Conscription is used, as necessary, to provide the requisite personnel for the forces. However, as is noted in some detail later in this report, large numbers of young Dutch males are disqualified or otherwise exempted from military service so that conscription is by no means universal. Enlistment in the military services is permitted at the age of 15, and all males not in service must register for conscription at the age of 18½. At the age of 19 they are administered a basic intelligence battery as a first step in determining eligibility for military service.

Responsibility for the examination of conscripts rests with a one-man office in the Department of Defence. The psychologist charged with this responsibility is Dr. E.S. van der Vleugel, Afdeling Dienstplichtzaken Departement

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* Drs = doctorandus (= licentiate, male or female)

van Defensie, Bleyenburg 38, The Hague. His office is responsible solely to the Netherlands Department of Defense. He operates autonomously and has no official contact with the three service military psychology programs. While this office was not visited, it is understood that van der Vleugel's research activity is concerned primarily with a continuing item analysis of his classification battery. The test battery itself has not been revised since its introduction some fifteen to twenty years ago. Moreover, each of the services administers its own basic battery and is little influenced by the results of the more general conscript testing.

In October 1965 an Interservice Committee on Psychology was established in the Netherlands Department of Defence. Prior to this time each service operated an autonomous program and there was no official interaction. The council is composed of four members, the directors of the three service programs, and van der Vleugel. Langelaar is the current president. A full-time secretary, Lt. T. Van Noort RNN, has been assigned to the council to assist in the conduct of its business. Van Noort, an educational psychologist, is currently on active duty to fulfill his military obligation.

For the first year and a half of its existence, the council reportedly was plagued with conflicts, differences of opinion, etc. After talking to a number of individuals about the work of this Interservice Committee, it would appear that the difficulties have in fact been resolved. Within recent months the Committee has actively launched into issues concerning policy with regard to selection batteries, cutting scores, cooperative development of new instruments, etc. Discussions with a number of Dutch military psychologists indicate that their general attitude towards the Committee now is quite positive. They anticipate that it will both increase in stature and become more active with the passing of time.

NAVY APPLIED PSYCHOLOGY AND RESEARCH PROGRAMS

With the reorganization of the Dutch military forces in 1964, three major bureaus or staff functions were established in each service. In the Navy, psychological research was made the responsibility of the Flag Officer, Personnel. Selection and training are the responsibility of what, literally translated, means the Chief of Staff. Thus, while the military psychologists have a direct responsibility for developing tests, formulating selection procedures, etc., they are not charged with the responsibility for the operational program in selection and training. Rather, they serve in an advisory role to the Commanding Officer of the Navy Selection Center. It would

appear that the arrangement works quite well in spite of the divided responsibility.

PERSONNEL RESEARCH BRANCH, MINISTRY OF DEFENSE (NAVY)

This office has responsibility for development of selection procedures, human engineering, development of training techniques, and the broad area of social psychology in the Netherlands Navy. The office is quite well known and highly respected among Dutch psychologists. The group is housed in comfortable and somewhat spacious quarters in the main Netherlands Navy Department building, at Lange Voorhout 7, The Hague.

The head of the program, Langelaar, is an extremely active, enthusiastic, and highly respected Dutch psychologist. A man in his early fifties, Langelaar was formally trained in educational psychology prior to entering military service. Although never serving as a line officer, it is obvious that he has a deep understanding of the military, knows how to work within the services, and is highly respected by his line colleagues. At the same time, he would appear to be equally as well respected by his civilian colleagues in psychology -- both in universities and in industry. In addition to his full-time military psychology activity, Langelaar has extensive part-time contacts both in the universities and industry. In fact, he is planning to retire from the Navy this September, and has accepted a position of considerable stature and responsibility in the civilian psychology community.

In addition to Langelaar, there are nine full-time and one half-time professional staff members in the Department, along with the necessary clerical and support personnel. All of the full-time psychologists are trained to a level roughly equivalent to the American PhD, and two staff members are formally trained in sociology rather than psychology. The majority of the staff are civilian, although there are three regular naval officers and one officer doing his conscript service as a uniformed psychologist. The uniformed personnel are required to meet the same academic and professional requirements as the civilians, and there appears to be little, if any, uniform-civilian conflict.

Morale of the group is unusually high; they have no staffing problems and no financial problems. In fact, it is quite refreshing to find an in-service military psychology group in Europe which holds such high status. Recruiting is not a problem. Positions in Langelaar's organization carry considerable prestige and jobs actually are sought out by

Dutch psychologists. There is very little turnover and no-one has resigned from the organization since 1961. Actual growth over the years has been in a large measure through the mechanism of conscript psychologists joining the staff as civilians upon completion of their obligated military service. The salaries are excellent, in all cases equivalent to comparable university positions, and in most cases equivalent to industry. Interestingly enough, the organization does not function on a set budget. Money is provided by the Navy on request, and the only item which requires any advance planning with regard to funds is the buying of computer time from a non-military organization.

The Navy psychology group operates with a minimum of formal structure or organization, and Langelaar has refrained from establishing divisions or branches. As various long-term research programs have been developed, personnel have been added to work specifically in given areas. Thus, each member of the organization has a given area of responsibility, which is based on the needs of the service and the individual psychologist's own professional training and interests. It is obvious that in addition to being professionally competent, Langelaar is an unusually skilled administrator. He has been responsible for anticipating the most productive broad programmatic areas in terms of the Navy's needs and the potential contribution of psychology, but the men responsible for the programs have almost total autonomy for their own work. Langelaar himself no longer participates in the ongoing research. Rather, his time is devoted totally to implementing research results and making it possible for others to work. His retirement this fall undoubtedly will constitute a significant loss to the program. In spite of the professional excellence of other members of his staff, none have the unique relationship with the Navy which Langelaar enjoys.

While there are no direct research contracts with universities, an extremely close relationship exists between the Navy psychology group and several university departments. Cooperative projects are undertaken, and university psychologists, such as Professor Mauk Maulder of Utrecht University, occasionally collect their own data using Navy subjects.

The Navy group does not have a formal series of reports. Results of their studies are contained in reports forwarded to appropriate Navy Department Boards. None of the research is classified, and it is published, usually in Dutch journals, if the nature of the work is of sufficiently broad interest.

SOCIAL PSYCHOLOGY

Drs. Paul M. Bagchus is responsible for the social

psychology program, assisted by Drs. J. Allegro and a staff of four or five conscripts. Their work falls under two broad headings; leadership, and morale or satisfaction.

A three week leadership training course for senior petty officers is conducted at the Naval Training Center in Hilversum. The course was devised by Bagchus and his colleagues, but actually is conducted by an unusually sensitive and effective group of line officers, with the psychologists serving as consultants. The purpose of the course is to enhance leadership effectiveness of the petty officers by developing their awareness of group phenomena and giving insight into the social behavior. Aside from this obviously applied goal, the course provides a basis for the long term leadership research program.

An intriguing aspect of this leadership program, which is one of the single most interesting and sophisticated military psychology endeavors in Europe, is the fact that its entire development and present structure is based on explicit theoretical formulations. Bagchus and his colleagues have been strongly influenced by the Ohio State leadership research, HumRRO studies, and Solomon's work on experimental design.

A variety of tasks are used, some of which involve pre-designated leaders and others that are designed to elicit emergent leadership. All of the tasks are of a problem-solving nature. For example, in one situation, with a designated leader, a group of seven or eight men are required to span a body of water utilizing materials drawn from a substantial source of supply. Before actually working over the water, a period of time is devoted to planning, making the necessary calculations regarding length of planks, weights, leverage, etc. Here specific details are worked out as to the sequence of steps for executing the task. The group then moves to either a large pond or swimming pool where the plan is implemented. The specific problems have been derived in such a fashion that effective and active leadership is required for completion of the assigned task. In some cases an intermediate step is introduced where a practice session is carried out indoors with a model before the actual task is performed over water.

Each evening, after completion of the group's work, the day's activity is analyzed and evaluated in a discussion group led by the instructors. Points brought up for discussion are those recorded during the course of the day by the instructor-observer. Here the emphasis is upon an analysis both of the leader's function and various aspects of group

interaction which were responsible for the ultimate outcome of the task. Obviously, the skill of the individual assigned as the instructor and discussion leader has a major impact on the effectiveness of the program. In fact, obtaining the services of line officers qualified to perform this function constitutes one of the greatest problems in managing the program.

In this program technical planning is considered an integral part of leadership. It is interesting to note that the leading causes of failure to complete the problems appear in a failure to plan and anticipate requirements of the task adequately. Next in order of frequency is the failure of individuals to carry out their roles assigned by leaders.

A field study, utilizing the four-group design, described in Solomon's 1949 Psychological Bulletin paper, is being carried out to investigate the effectiveness of the training. Three months after the petty officers have completed the course and been assigned to duty station, measures are obtained on leadership attitude, leadership behavior, and leadership climate of the ship or station at which they are serving.

Working with Hofstee, Bagchus has developed a scale which includes three dimensions of leadership: (a) individual prominence, (b) consideration, (c) initiating of structure. Reportedly, the variable of social desirability, which consists of 19 forced choice items, has been eliminated from the scale.

Four hypotheses are being tested in the study. The first is concerned with the variable of leadership participation. Here it is hypothesized that the greater the participation in leadership training, the greater the benefit of the training. Secondly, it is predicted that there is a positive relationship between leadership status in training and the effectiveness of the training course. Next, it is hypothesized that men who manifest a higher degree of satisfaction with the Naval service also receive greater benefit from the training program. Finally, it is postulated that the leadership "climate" of the man's duty station will have a mediating influence on the effectiveness of the training program.

All of the various scales and measuring instruments for the research have been developed and pretested. Data collection has commenced but has not progressed to the point of analysis. One cannot help being impressed with the sophistication of this work and the meticulous care with which it is being carried out. Moreover, this is an excellent example of the type of study of a complex research problem area in which a relatively small-sized military service is a distinct advantage.

Many of the problems of data collection, dispersion or loss of subjects, cooperation, etc., which would be encountered in a force of the size of the US Navy are minimized here.

The second problem area in the social psychology program is that of morale or satisfaction. By use of a factor analytic approach, a satisfaction measure has been devised which consists of five subscales: (a) general satisfaction with life in the Navy, (b) satisfaction with specific work assignment, (c) satisfaction with military career, (d) satisfaction with leadership and current duty station, and (e) a present workload and life circumstances scale. Statistically, the five subscales have a high internal consistency and low intercorrelation.

Work has been under way for some time utilizing the scale in a comparative study of personnel assigned to naval aviation and to general fleet duty. Findings to date indicate that among enlisted personnel in both groups satisfaction is high upon entering the Navy but it progressively declines until the individuals make their first advancement in rate. At this time there is an upswing in the satisfaction curve. Secondly, the satisfaction or morale curve appears to show a marked decline as the time of re-enlistment approaches, roughly six years after entering service. Thus it is apparent that changes must be introduced in the Navy which will bring about a reversal of this decline and possibly enhance the current low re-enlistment rates. A third finding growing out of this study is that satisfaction is generally lower among personnel in the Navy-Air wing than among men assigned to other types of duty. This has been attributed to uncertainty as to the future of naval aviation in the Netherlands.

Results of the studies in social psychology, for example past work on re-enlistment, attitude and morale, are forwarded to the Navy policy councils along with proposed recommendations for corrective action. It is reported that a rather high proportion of the recommendations actually are adopted and implemented.

HUMAN ENGINEERING

Human engineering is the most recent problem area to be tackled by the Navy group. Lieutenant J.W. van Borselen, a regular Navy officer who was trained in psychology after initially being commissioned in the line, is responsible for this area. Van Borselen had some exposure to human engineering research and practice during his university training;

however, he is somewhat less experienced than might be desirable for an individual launching a new program. To date, all of his time has been occupied as a consultant, and it is anticipated that an active research program will not be initiated in the near future.

Van Borselen, whose own interest is in interior ship communications systems, sits as a full member of the Shipbuilding Department Committee which coordinates, controls, and establishes policy for new construction in the Netherlands Navy. While van Borselen is a very personable individual and has a distinct advantage in having served as a line officer, it would appear as if he is fighting an uphill, albeit successful, battle to establish his place on the Committee. The line officer members of the Committee, naval architects, etc., are uncertain as to where and how human engineering fits into their shipbuilding activity. Van Borselen has rather wisely approached his task through making available information on accepted research findings in human engineering and problem solving techniques which are appropriate to issues under consideration by the Committee.

Van Borselen also acts as the liaison officer between the Netherlands Navy and the Schusterberg Institute of Perception. Reportedly, there is only one man now working in this area at Schusterberg. He feels that there is a lack of communication between the universities and the Navy on human engineering problems. This could become a significant difficulty if the Navy human engineering effort does develop into a truly active program. Thus, if the present resistances on the part of engineers and line personnel are successfuly overcome, it is almost certain that the question of research laboratories, equipment, and personnel will create additional difficulties.

In passing, it should be noted that van Borselen has a rather intriguing supplementary duty assignment. He serves as adviser to the Recruiting Department of the Navy. In this billet he has the responsibility of reviewing all advertising for recruiting with a view towards persuasion and communication. To date, this has been done on a somewhat informal and ad hoc basis; however, a series of formal studies is now being devised to put this effort on a more systematic and objective basis.

PROGRAMMED INSTRUCTION AND TRAINING RESEARCH

The programmed instruction project is under the general guidance of Drs. M. Beishuizen. Dr. John Nagay recently discussed this work in connection with his NATO review (ONRL-18-66), so only an outline will be given here. Programmed

instruction is not a major activity of the Dutch Navy psychology program, although work has been underway for some five years. The effort started with an attempt to program the teaching of military insignia to recruits. This was followed by programs to teach binary math as well as remedial arithmetic.

An interesting situation exists in the Netherlands Navy whereby new techniques may be developed by the psychology groups, although a completely separate organization is responsible for making decisions as to whether the innovations will be adopted. The Education Branch of the Navy does not employ any professional educators, and programmed instruction was not fully appreciated until approximately two years ago. At that time officers from the Education Branch attended the NATO Conference on Programmed Learning which was held in Naples. Following this Conference there was a marked change of attitude, and work in the area has been stimulated.

Beishuizen conducts courses in programmed writing for officers and petty officers who serve as instructors. The instructors, in turn, write programs for their courses in addition to their regular duties. A conference is held once each week at which Beishuizen acts as a consultant and helps with the effort. A change is planned in this less than desirable makeshift arrangement and the Education Branch of the Navy will employ a full-time professional within the next year to supervise the area of programmed instruction. While Beishuizen will continue to act as a consultant to the Education Branch, his primary duties will be devoted to methodological and development studies in the area of education and training.

SELECTION RESEARCH

Drs. B. Buiten has headed the selection research programs since 1961, when de Wolff left the Navy psychology program. Selection research apparently never has received the emphasis in the Netherlands that it has in many other countries. It appears as though the manpower pool far exceeds military requirements and, as will be discussed later, rejection rates are quite high. Moreover, a large proportion of men assigned to skilled jobs such as machinist, electrician, etc. are trained in civilian life before they enter the Navy.

Until 1961 the basic battery used in the Dutch Navy was a power test which took approximately 3½ hours. Buiten's first research effort in the Navy was to construct a speed battery which would produce comparable results. Using a factor analytic approach, he analyzed a battery of 46 tests used in the Navy and Air Force. Ten factors were identified

and a speed test constructed which, in a period of 1½ hours, including instruction time, produced equivalent results to the power test battery. The new battery was introduced in 1964.

Buiten is currently working with Dr. W. Hofstee, an unusually capable half-time employee of the Netherlands Navy psychology program, in developing a personality test which will be used to supplement the present basic battery in selecting recruits. This test is an outgrowth of Hofstee's dissertation, and is a continuation of work he started during a year at ETS in Princeton.

Buiten also spends time as a consultant in the actual Navy selection program, although the practical work is the primary responsibility of a separate command. In fact, with Langelaar's impending departure from the Navy, Buiten is becoming increasingly occupied with administrative responsibilities and his research program now is relatively inactive.

ROYAL NETHERLANDS MEDICAL EXAMINATION AND SELECTION CENTER, HILVERSUM

All personnel, male or female, officer and enlisted, entering the Netherlands Navy are processed through one central recruiting and examining activity. This command, which was opened in 1961, is physically located at Hilversum, about 40 miles from The Hague. The center is commanded by Captain W.A. de Looze, a line officer who was one of the Netherland's greatest naval heroes during World War II. The center includes four separate subordinate commands: medical, psychological selection, classification, and enlistment or appointment. There also is an intelligence office that carries out security screening procedures.

In addition to the selection and classification procedure, basic and certain advance training for the Netherlands Navy takes place at the Hilversum Center. No attempt will be made in this report to discuss the activities of the training command. Leadership training, which is based on research developed by the military psychology group, has been outlined in a preceding section.

The physical layout of the Center is quite unique. The building was constructed in 1961 and was designed specifically for use as a selection center. The five wings are arranged in a circular fashion with their entrance at the hub. This center or hub area has a covered passageway so it is possible to get from one activity to another without going outside. Approximately 10,000 to 12,000 men and women a year are processed here.

Officer Selection: Selection of midshipmen is somewhat of a problem. It is openly acknowledged that the better quality young men in the Netherlands go to the university. Approximately 70 applicants each year are selected for entry. Almost every man with a secondary school certificate in math and science who meets the necessary administrative and medical qualifications is accepted, and approximately 50% of candidates with language or economics background are accepted. Parenthetically it might be noted that one of the means proposed for increasing the pool of eligible candidates is to raise the academic standards of the Academy so that a military education is in fact equivalent to that received in a civilian university.

The basic officer selection battery has not been changed for a number of years. In addition to a battery of psychological tests, the officer candidates go through a leaderless group discussion procedure as well as a leaderless situation test, modeled after the British War Office Selection Board procedure. There is no standardized scoring for these latter procedures: raters make notes and summarize each individual's behavior on factors such as initiative, sociability, etc. Each candidate is then seen by a team of three psychologists. Two act as interviewers and the third functions as an observer. At the conclusion of the interview all three rate the candidate individually on ten categories. A summary of his assets and weaknesses is prepared which utilizes all available information. The candidates then are rated with a single composite numerical score.

The final selection procedure is conducted by a board of three flag officers, who interview each candidate and utilize the rating supplied by the psychologists, although the degree to which they depend upon the psychologists' material is uncertain in view of the bias towards math and science students as noted above.

This procedure is being studied by Buiten, but progress is slow because of the small number of midshipmen appointed each year. Analysis of data on all cadets appointed between 1960 and 1965 is partially complete. On the basis of this data it would appear that performance on the basic psychological test battery only is predictive of standing at the Naval Academy. As might be expected, there appears to be some positive relationship between age and civilian school grades.

Enlisted Selection Procedure: The Netherlands Navy is composed roughly of 22,000 officers and men, 80% of whom are career personnel and the remaining 20% conscripts. (It is

interesting to contrast this with the figure for the Army, where nearly 90% of the enlisted personnel are conscripts.) Enlisted volunteers are accepted from the age of 15 and serve for a minimum period of six years. However, the volunteer has the option of leaving the Navy at the end of his first three months of training if he does not desire to continue for a full enlistment. Conscripts serve for a period of 21 months. The re-enlistment rate is rather low, as in the US Navy, with approximately 60% to 70% of the personnel leaving.

Of the volunteers processed at Hilversum, only 45%-50% are actually accepted for service. In spite of this amazingly large percentage of disqualification, it should be noted that rejection by the Navy does not in any way exempt a man from subsequent conscripted service in the Army. Less than 5% of applicants for enlistment are rejected because of failure to meet cutting scores on the basic test battery. Some 3%-4% withdraw voluntarily during the course of the selection procedure. The remainder, in excess of 40%, are disqualified for medical reasons.

The largest single source of medical disqualification is on the basis of emotional instability. All recruits are administered an individual Rorschach and Wechsler-Bellevue by student psychologists, who operate under the direction of the Medical Department. One uniformed psychologist, who is also trained as a naval aviator, is attached to the Center as a consultant from Langelaar's program. However, there apparently is an absolute cleavage between the Medical Department program and the psychology program.

It is unclear as to the degree of sophistication and training of the students administering the projective and intelligence tests; however, one obtains the impression that they are enrolled in introductory testing courses. When a question arises as to an applicant's suitability for Naval service on the basis of this testing, he is referred to a psychiatrist for individual interview. This interview, of approximately an hour's duration, culminates in a recommendation for acceptance or rejection for service. It is understood that no formal or informal research has ever been undertaken on the psychiatric selection procedures. Moreover, the Medical Department reportedly is opposed to undertaking any such effort. Probably most fascinating of all is the fact that apparently no questions have been raised regarding the rejection of 25%-35% of applicants for enlistment through this procedure. In the same vein, it is also interesting to note that less than 10% of applicants are rejected for medical reasons unrelated to psychiatric factors.

In spite of the rather startling rejection rates in the case of volunteers, almost 100% of the conscripts processed for naval service are accepted. It would appear that the requirements for conscript service in the Navy are unusually high, so that almost all men who possess the necessary degree of civilian training, skill, and occupational stability will be accepted. For some reason, psychiatric disqualification of this group is insignificant. It likewise is interesting to note that, similar to volunteers, those conscripts rejected by the Navy are returned to a central pool for allocation to the Army. From discussions with staff members at the Selection Center it would appear that this unique position of the Navy with regard to military manpower has existed for years and is not looked upon as being unusual. While this same situation may exist in other countries, it certainly is unique in the experience of this observer.

PSYCHOLOGY AT THE ROYAL NETHERLANDS NAVAL ACADEMY

Approximately five to six years ago, Professor Mauk Maulder conducted an experiment on communication in groups, using Naval Academy cadets as subjects. Just about this period the Navy was becoming concerned with devising more effective and systematic ways of teaching leadership. By coincidence it was also quite concerned with devising methods for raising the academic achievement level and standards of the Academy so that the education would be equivalent to that of Dutch universities. Langelaar, capitalizing on this combination of events, urged that social science be included in the curriculum along with technical subjects.

Last fall a Department of Social Science was formally established. Dr. M.R. van Gils, a sociologist, has been appointed head of the Department. At present he is still attempting to develop a focus and direction for his new Department. The aim of social science training of cadets is seen as an attempt to "give people an insight into social behavior which they can use in daily living." In terms of planning to date, it is anticipated that emphasis will be placed both on individual psychology and a combination of social psychology and sociology. An effort is being made to integrate basic or core principles with actual training experience. This means that in addition to lectures, a training program will be developed which, in terms of the student, is of an involving nature. Accepted theory in group behavior and interaction will be demonstrated through experimental situations in which the cadets themselves participate. Thus, they will not only have an opportunity actually to experience the group phenomena in question but through lectures and discussions will receive appropriate

feedback information. One of the primary problems encountered prior to development of this new leadership program -- and one which still constitutes a major issue -- is the response of students of "What am I going to do with all of this after I have learned it?"

It is planned that social sciences will be taught two hours per week during the first three academic years. The first year will be devoted to individual and general psychology; the second will be concerned with social psychology and sociology. This will be followed by a year devoted to the psychology of organization and the military as an institution. During the fourth year, when the students are at sea on training cruises, an attempt will be made to conduct studies aboard ship in the area of communication, group structure, etc. In the fifth and final year at the Academy, students will be required to make a formal literature survey on a topic of their own choosing which culminates in a thesis. At present it is anticipated that clinical psychology and psychopathology will be omitted from the curriculum.

ROYAL NETHERLANDS ARMY PSYCHOLOGY PROGRAM

The Social Psychology Affairs Office of the Netherlands Army is responsible to the Chief of Army Personnel and has a twofold mission: (a) development of selection procedures, and (b) training of selection officers in interview and group observation techniques. The only psychologist in the program is Drs. J. de Klerk. He is assisted by two regular army officers and three to five conscripts.

The actual operational program for personnel selection in the Army comes under the Chief of General Staff, so, as in the case of the Navy, the operation and research program is separated. De Klerk's office is located at the major Army Selection Center, SCKL Kamp Waterloo, Amersfoort, rather than in The Hague. De Klerk would appear to have a close and effective working relationship with the commanding officer of the Selection Center, although his formal relationship is technically that of a consultant. Some 35,000 men per year are processed at Kamp Waterloo.

The enlisted and conscript test battery was developed some time ago and has not been modified in recent years. Similarly, the officers' selection program, which is modeled after the British War Office Selection Board procedure, has not been changed for many years. Officer candidates are subjected to a leaderless group problem-solving situation and run an obstacle course. Indoors they participate in a leaderless

discussion, prepare autobiographies, and receive a paper and pencil test battery. Finally, they are seen in a semi-structured interview by one of 20 line officers who have been trained in interview technique by de Klerk. Scores and comments accumulated during the two-day examination procedure are summarized in a conference of examiners, and each man is rated on a four point scale. This assessment procedure results in failing approximately 60% of the applicants. Ninety percent of the total disqualifications for all causes in the case of officer candidates is on the basis of "leadership," with the remaining 10% being psychiatric, physical, etc.

Because of the demands made upon de Klerk's time in training interviewers and observers for the WOSB procedure, as well as acting as a consultant in the selection program, he finds it impossible to carry out an active research program. Accordingly, while some information is available on the reliability of the semistructured interview, there is no data on validity either of the procedure as a whole or any given segment of the selection battery, subsequent attrition, etc.

It would appear that the only outside source of professional stimulation in the Army program is the inter-service committee on psychology discussed earlier in this report.

ROYAL NETHERLANDS AIR FORCE PSYCHOLOGY PROGRAM

Psychology in the Royal Netherlands Air Force dates from 1951, when Professor Fokkema was appointed head of the pilot selection program. Prior to that date the Army WOSB procedure also was employed by the Air Force. Fokkema revised the program and introduced a basic test battery.

Drs. F.J.B. Teerink became director of the program in 1964. In addition to Teerink there are two civilian and five conscript psychologists, as well as one sociologist, in the program.

The place of psychology in the Air Force organizational hierarchy is identical with that of the Army and the Navy. Thus, Teerink is responsible to the Chief of Air Force Personnel, although he provides techniques and consultation service for the Selection Center at Gilze-Rijen, which is under the Air Force Chief of Staff. The Office of Air Force Selection Affairs is located at Kalvermarkt 28, The Hague.

While the Air Force program does not appear to have the scope, magnitude, or sophistication of the Navy group, it would appear to be in the process of growth. There is some

active research, although this tends to consist of isolated studies rather than being of a programmatic nature. Probably the largest study undertaken recently is a follow-up of all candidates tested over the past ten years with the pilot selection battery. The goal of this work is to determine if there is any change in the validity of the selection battery as a whole, or its sub-tests, over the years against a criteria of pass and fail in training. Obviously there have been marked changes in the training programs and demands made upon the candidates during this time span which has seen the transition from propeller to jet aircraft. It is expected that this work will be followed by the development of a new battery incorporating any of the old tests which appear to have survived over time.

A study is being made to elicit information which might be used to boost the morale of men assigned to air police and other guard duties. Here depth interviews are being conducted with a representative sample of 20 to 30 men and a scale will be developed on the basis of information elicited during these interviews. Work is also under way on tests for the selection of radio operators and several other specialty rates.

A study recently has been completed on leisure time activity of airmen. This effort was in the nature of fairly straightforward survey research in which leisure time activities and preferences were obtained from a random sample of men. Reportedly, a number of changes have been made in the recreational facilities available to Dutch airmen as a result of this survey.

Teerink's group has not been active in the flight training program to date. However, a literature survey on objective measures in flight training currently is under way. With the passing of time it is hoped that the group will be able to develop a greater influence on training.

There is no formal contact with any of the Dutch universities, but informal relationships have developed in several places, particularly with Fokkema's department.

Pilot Selection: In addition to the paper and pencil test battery, all Air Force cadets go through a modified WOSB procedure at the Air Force Selection Center at Gilze-Rijen. This procedure, developed specifically for use in the Dutch Air Force, is considerably more systematic and theoretically oriented than that used by the Dutch Army.

The subject's performance in the leaderless task is

rated on three factors, prominence, effectiveness, and sociability. Each man is rated three times during the course of his performance on a given task by each of two observers. The ratings then are pooled to give a single compositve summary of the six individual scores. Four different types of task are used in the test procedure: (1) the typical outdoor problem-solving situation, (2) leaderless group discussion, (3) a group mechanical construction task, and (4) a group verbal problem-solving situation in which the subjects are required to plan the location for an airport. Validity studies have been made of this phase of the selection procedure which correlates 0.10 with flight training and 0.20 with officer training. While both the psychologists and line selection officers at Gilze-Rijen feel that procedure does not make any significant contribution, it is retained because of face validity.

In addition to the above, the officer selection battery includes peer ratings, tests on reaction time and depth perception apparatus, and an interview. As indicated above, research currently is under way to determine the relative contribution of each of these procedures to the total test battery.

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This report describes and delineates in some detail the duties and research of the military psychiatry programs in the three military services of the Netherlands Department of Defense.

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MILITARY PSYCHOLOGY IN ISRAEL

BY JOHN E. RASMUSSEN

7 August 1967

UNITED STATES OF AMERICA

NOTE: This report is based on a visit made approximately one month before the recent Israeli-Arab conflict. It has not been modified to reflect developments subsequent to last April.

I N D E X

MILITARY PSYCHOLOGY IN ISRAEL

INTRODUCTION

A visit to Israel is a truly unique experience for a psychologist concerned with research and applied work in a military context. Although the history of the Israeli military psychology program is relatively short, approximately 19 years, this entire period has been marked either by overt conflict or a constant state of military alertness. It is doubtful whether there is any other country in the world where a military psychology program has been developed and has functioned for so long in an environment of constant alertness and actual skirmish.

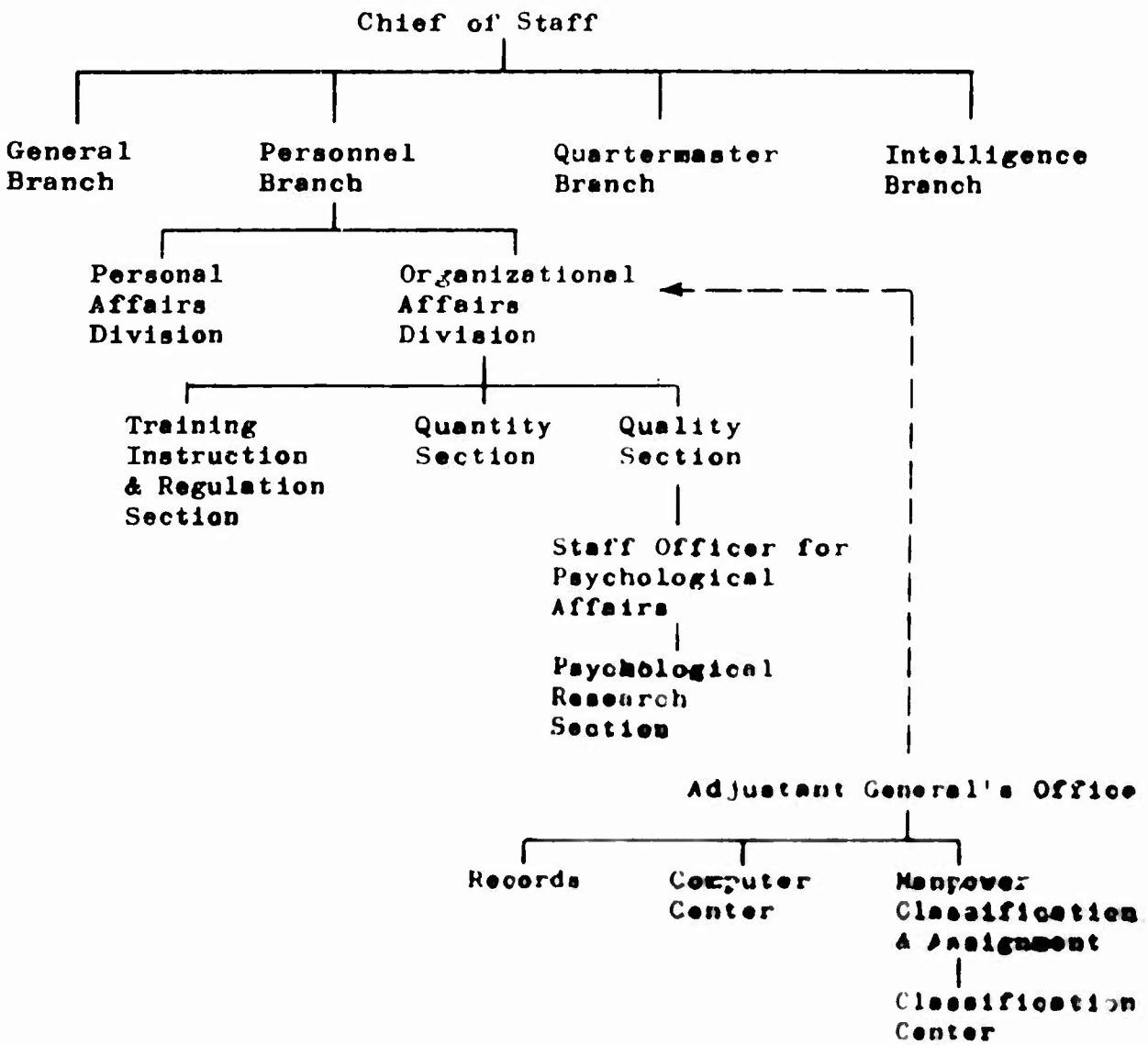
For the Israeli psychologist, the military may provide an interesting professional challenge because of the excellent opportunities which exist to develop, test, and apply psychological theory; however, one also receives the impression that there may be a degree of emotional dedication to the task which is seldom encountered elsewhere. Psychology appears to be well accepted by the Israeli Defence Forces, and because of the small size of the country and its armed forces, feedback to the psychologists engaged in research efforts is excellent.

The information contained in this report was obtained during a three-day visit in April to the Israeli military psychology group. The visit was made on an unclassified basis, and the fact that an unclassified technical report would be written was clearly established at the outset. This frame of reference, obviously, put certain constraints on topics discussed and the degree to which detailed information may be reported here. As might be expected, the present political-military situation in Israel has brought about a profound degree of security consciousness. While there has been some relaxation of classification on military psychology research and applied efforts, this is by no means complete. Thus certain aspects of the current Israeli military psychology effort are not covered here. Security classification policies prevent disclosure of information on topics such as sample size, acceptance and rejection rates, attrition, etc. Generally speaking, the program as a whole probably operates under greater security constraints than any comparable military program encountered during a three-year tour of duty as a liaison scientist for psychology in ONR London. While these restrictions at times became a handicap in discussing statistical aspects of research, this did not significantly detract from the value of the visit. It is difficult to imagine a

more positive and genuinely warm reception than that given by the Israeli Defence psychologists, and the fact that certain areas or details could not be shared was mutually accepted without embarrassment or concern.

Place of Psychology in Israeli Defence Forces Structure:

In order to appreciate the role of military psychology in the Israeli Defence Forces, it is necessary to sketch briefly the organization of the Forces and to outline where and how psychology fits in. No attempt will be made to outline the total defence structure; therefore the following organization chart is incomplete as it deals only with those offices and groups which are of concern in military psychology.



The Personnel Branch, designated as A Branch, is of primary interest in the psychology program. The Training Instruction and Regulations Section of the Organizational Affairs Division is responsible for developing training programs as well as determining guidelines and policy for their management. Training per se is a function of the General Branch. The Quantity Section is concerned with manpower planning, quantitative projections as to availability of men and military requirements, and determining the size of the preliminary training programs. The Quality Section is responsible for establishing induction standards and determining the quality of the input necessary to meet personnel requirements for all three Services. The Psychology Research Section, headed by Lt. Colonel Mordecai Eran, is part of the Quality Section.

As indicated on the above chart, the Adjutant General's Office of the Defence Forces also is responsible to the Chief of the Organizational Affairs Division. The Adjutant General's Office has three major responsibilities or functions: Record Maintenance, Management of the Computer Center, and Enlisted Manpower Classification and Assignment. There is a section in the Manpower Classification Branch that is responsible for the development and maintenance of the psychometric batteries used in classification.

The Israeli Defence Force is a tri-service structure with the Army, Navy, and Air Force chiefs reporting directly to the Chief of Staff. There are various corps, Supply, Medical, Engineering, etc., the most important of which is the Education Corps. The head of the Education program is considered to hold a position both of prestige and responsibility. His group has a twofold function. First, it is responsible for the indoctrination of all Israeli military personnel on general political-military matters. A very unique and important aspect of this function is the development of a sense of Israeli national character among the Service personnel who come to the Forces with extremely heterogeneous cultural and language backgrounds. The Education Corps is also responsible for a more classic type of academic program. In Israel the military service is used as an opportunity to correct educational deficiencies among the younger people of the country. Formal academic courses are operated which ensure that all members of the military service will have completed at least eight years of schooling before returning to civilian life. Beyond that, a four-months post-service technical program is operated at the secondary level for individuals completing their military obligations. Courses are designed to aid the Corps in assisting individuals without a specific trade to obtain gainful

employment upon return to civilian life.

HISTORY OF MILITARY PSYCHOLOGY PROGRAM

Military psychology in Israel began in 1948 with the formation of the Israeli Defence Forces. The major effort at that time was on pilot selection for the Air Force and on the selection and classification of enlisted personnel for Army service. The Air Force pilot selection program began under the direction of Professor Ronald Shouval, now at Tel-Aviv University, who until a year ago was a Lieutenant-Colonel in the Army and headed the military psychology program. In 1950 the Air Force and Army effort were united and a Psychotechnical Center was formed. The British War Office Selection Board assessment procedure was introduced along with several batteries of psychological tests. During this era most of the instruments and techniques used in the Israeli military forces had been developed in the US and Great Britain. The tests were translated into Hebrew and adopted without further modification.

With the formation of the Psychotechnical Center a research section was developed under Dr. M. Reeb and tests were standardized on Israeli populations. At the same time, because so many members of the service did not know Hebrew, a series of nonverbal tests were developed to overcome the rather pronounced language problem.

In 1953 the Manpower Classification and Assignment Center of the Adjutant General's office was opened and the psychology group transferred to that activity. At the same time the responsibility for psychological research was assigned to the Chief Psychologist in the Israeli Defence Forces Headquarters. This led to an extension of the research program into the broad areas of social and personnel psychology. Routine work on the maintenance of basic selection and classification batteries, however, has remained with the Selection Center.

PROGRAM ORGANIZATION AND MANAGEMENT

The Chief Psychologist of the Israeli Defence Forces is a regular Army officer, Lt.-Colonel Mordecai Eran. Eran took his bachelor's degree in psychology just before the Israeli War of Independence. During the war he served as an infantry officer and was seriously wounded. He remained in the Army, however, and his entire postwar career has been in military psychology. He holds a PhD from the University of California, Berkeley, and considers himself an industrial psychologist by training and interest.

Eran's primary office, as Chief Psychologist, is in the Israeli Defence Forces Headquarters. Here he has the administrative responsibility for the assignment and professional functioning of all psychologists in the military service. In addition he has the technical responsibility for all psychological research conducted in the Armed Forces. The psychologists working in operational or applied settings are professionally responsible to the command which they serve.

Both uniformed and civilian psychologists are used in the Israeli Defence Forces. All of the senior psychologists are PhD's, with the overwhelming majority being graduates of American universities. The junior psychologists, who generally have lesser academic training, for the most part are reserve officers fulfilling their military obligations. It is interesting to note that because of the Israeli conscript and reserve military service regulations, all of the psychologists, both civilian and military, have served in uniform. Moreover, inasmuch as all Israeli officers are selected from the ranks, the psychologists also have had experience both as enlisted men and as officers. A number have had active combat service. There is a shortage of psychologists in Israel, and this is felt in the armed services as elsewhere. On the other hand, the military psychology program does have the advantage of being able to utilize the services of individuals who are fulfilling their military obligations.

Relationships with Israeli universities are excellent. In fact, all of the senior military psychologists, including Eran, hold part-time university appointments. The quality of the senior people in the program is uniformly high, and they all have established reputations in civilian professional circles on the basis of their professional accomplishments. This, plus the general Israeli interest in defence matters, results in military psychology being far better accepted than in most countries. One of the greatest obstacles which the group has had to face, but one which is diminishing somewhat now, is the restriction of publication in the open literature. Until recently, only work carried out in university laboratories could be published. However, it now is possible to publish theoretical work from the military research program, providing the papers give no information on the Israeli Defence Forces per se.

The most interesting aspect of military psychology in Israel is the research effort. Accordingly, this will be treated in the next section of the report with the operational program being summarized at the conclusion.

PSYCHOLOGICAL RESEARCH SECTION OF A BRANCH

The Psychological Research Section of A Branch is physically located at the Defence Forces Classification Center on the outskirts of Tel-Aviv. The Section is housed in a barracks-type building which is rather spartan and barren in appearance, although it differs little from other buildings at this base. Each psychologist has his own office. There is a small, although well-stocked, professional library and conference room, and a somewhat limited IBM data processing and storage facility.

At present Eran continues to act as head of the Section, a position which he held prior to his being appointed as Chief Psychologist of the Defence Force. Reportedly, the post has been vacant for over a year -- in fact, since Shouval left the service -- as none of the senior psychologists has any desire to take on administrative responsibilities. Even though the contrast in environment and situation is extreme, the story of finding a head for this branch is quite analogous to the problem encountered in replacing departmental chairmen at American universities. There are no formal divisions or groupings in the research organization. Each senior research officer works in his own particular field of endeavor and has one or more junior psychologist to assist him, along with the necessary supporting clerical and technical personnel.

The problems tackled by the research section originate both from within and outside the organization. The primary direction comes from requests which originate in various offices of the Israeli Defence Forces; however, an increasing share of the work is being generated by psychologists who serve as consultants to field organizations. An annual meeting is held where key personnel in the Israeli Forces are brought together to review and comment on the current direction of the research effort.

A committee, composed of the psychologists in the Research Section, as well as selected personnel from the Education Section and other branches of the Service, considers all research proposals and reports. The proposals and drafts of reports prepared by all investigators, regardless of seniority, must be approved by this committee. Reportedly the meetings are marked by total candor and critical specificity reminiscent of a graduate seminar. The frank goal of the committee is to "wash dirty linen" internally so that work emanating from the Research Section will be as professionally sound and meaningful as possible. To the outside observer it would appear as though this worked reasonably well; it will be evident in the comments that follow that all work of the Research

Section is good, even though some aspects may be "better" than others.

Eran, even though he now serves as Chief Psychologist, manages to spend a great deal of his time in the Research Section. In addition to serving as temporary head of the Section, he is teaching and supervising graduate students at Bar-Ilan University, and he is also active as an investigator. Eran and his assistants provide a certain "fire department" type of support in conducting polls on problems of particular interest to the military service. Moreover, he is active in the program on pre-military training of personnel who have not reached the age of conscription. Eran also is working on a personality inventory which he hopes will replace the present time-consuming and expensive interview.

Dr. J. Rosenberg was born in the US and received his PhD from Columbia University in social psychology. His primary interest is in the area of delinquency and psychological problems of training. Rosenberg's present research is concerned with the training of tank crewmen and is patterned quite specifically after HuMMRo investigations in this area. The work began at the request of the Army, since apparently there was dissatisfaction with the training course as it existed, both because of an imbalance of the proportion of men qualified to perform various tank crew functions, and because the course was too long. Rosenberg approached his problem by sitting through the course for tank crewmen and making an analysis in terms of (1) rote learning versus meaningfulness of material, and (2) functional context training -- massed versus spaced learning.

He found that the material taught was not being truly related to the subject matter. In fact, it appeared that the actual learning process was being subordinated to administrative problems of classroom assignment, scheduling, etc. Rosenberg and his assistants reorganized the material into related blocks and eliminated rote memorization of unessential information regarding equipment. In essence, the focus was placed on meaningfulness of material and systematic introduction of information in a functional context. It is reported that this effort has been so well received that there has been somewhat of a boomerang effect: the training officers are so pleased with the revised curriculum that they see no need to carry out the systematic follow-up studies which Rosenberg would like to conduct. He is now involved in a restructuring of the maintenance training program. The procedures being followed are essentially those used in the work described above.

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There is nothing particularly original or new in the training research which Rosenberg and his colleagues have been carrying out. They are, however, both well aware of this fact and quite obviously capable of more sophisticated effort. The decision to work on the practical and empirical level deliberately has been made to capitalize on the limited professional resources available within the psychology program. In discussing his program, Rosenberg tends to display ambivalence rather than dissatisfaction. He obviously has a strong professional need to delve deeper into the problems with which he is faced. Nevertheless, he clearly realizes that his more superficial approach is in fact producing positive results for the services.

One of the strongest and most creative of the Israeli military psychology group is Dr. M. Reeb, a South African who holds a PhD from London University. For a number of years Reeb has been working in two major areas, manpower quality planning and optimization of classification procedures. Work in the first area was initiated some time ago to develop a routine procedure for determining how adequately the quality requirements for military manpower input could be met in future years. The goal for this effort was to construct a series of manpower-quality indices which would relate both the military requirements and the degree to which these requirements would be met by the service-age Israeli population at any given time in the foreseeable future.

As a first step, Reeb performed a job analysis on 115 military billets to establish minimum acceptable language, education, and general intelligence levels. Cutting scores were determined empirically by ascertaining the minimum scores of men satisfactorily performing during a period of extreme manpower shortage. Next, he took additional samples of men and attempted to develop a criterion measure, which permits men to be rated on a scale from zero to five, in terms of "value" or performance effectiveness to the Army. A further series of studies was conducted in which the criterion measures were obtained on samples of men, in the 115 types of billets in question, who possessed varying quality-index scores. It was found that the intelligence and a general interview rating were better predictors of the criterion than the score on education. Replication of these studies has demonstrated that the quality indices of manpower consistently correlate with the criterion measures in the vicinity of 0.55 - 0.59. Work on this problem came to a natural conclusion several years back when the quality of Israeli manpower increased to a point that there usually is overqualification in the more routine billets. In addition, a large number of programs are easily filled with volunteers who exceed minimum scores, and many technical billets

are occupied by individuals who have learned the appropriate trade or skill prior to entering the military. The quality index classification system still is used in assigning men who do not volunteer for special programs or who do not have a trade. Thus, the system now is essentially a classification procedure although it was never intended for that purpose.

Reeb's current interest is in the optimization of classification procedures. Essentially, this is a sophisticated expansion of the first problem area. Reeb began a differential classification program very much along the lines used by the U.S. Army Personnel Research Office. Substantial quantities of information on individual soldiers is collected and a computer utilized to predict towards a criterion.

Another phase of the work is concerned with long-term prediction of potential in personnel allocation. Here, an effort is being made to develop objective methods of personnel allocation which consider factors such as individual promotion potential as well as over-qualification for both present and anticipated future billets in a particular military specialty. A third tangent of this research effort is the attempt to develop techniques for integrating what Reeb refers to as "the old sergeant intuition" with more objective indices in personnel placement.

Finally, an attempt is being made to develop questionnaires which will replace the individual interviews now used. The interview has proved a fairly powerful although time-consuming tool in the military psychology program. While this work is still in a relatively early stage, none of the questionnaire forms developed to date have shown the predictive validity of the interview. At the same time, intercorrelation with the interview is sufficiently low that it is quite possible the two procedures are not sampling the same information.

Dr. Y. Amir, a social psychologist trained at New York University, is concerned primarily with officer selection. His past work in this area includes studies of inter-rater reliability in selection programs, development of criterion measures against which to predict in selection programs, studies of social relationships between officers, and attitude and public opinion surveys on military officer careers. At present Amir is concerned with the low retention rate for Army officers. Problems have been experienced for some time in retaining officers beyond their compulsory two and a half years of service. The study, now in its fourth year, has provided some preliminary data. Samples of officers are interviewed every second year while in service and within six months after they leave. Two

broad groups of men who are extremely difficult to retain in service have been identified: officers who enter the service from a kibbutz, and intellectually promising individuals who wish to obtain a university education. It appears that a number of recommendations will be made on the basis of this program, including the development of a modified college program for career officers and attempts to modify attitudes in the kibbutz towards career military service.

Amir is also working with a sociometric approach to selecting non-commissioned officers. Except for one feature, this work does not differ significantly from the body of studies of this nature which have been conducted in the U.S. military services. The sociometric instrument has been developed with "filler" items which sample morale. The morale items, in and of themselves, have some predictive validity. However, they are primarily used to provide feedback to military commanders regarding the current morale of their troops.

APPLIED MILITARY PSYCHOLOGY PROGRAMS

The research program, which is partially described above, constitutes only one aspect of military psychology in Israel. By far the largest part of the effort is concerned with applied or operational psychology programs.

Military service is compulsory in Israel for both males and females, although there are many ways in which women can and do avoid service. Men serve for 2½ years from the age of 18 and women have 20 months of obligated service from 18. While there is an academic reserve program for men which combines university and army training, there are few ways in which a physically and mentally able man can avoid service at some point in his life. Women tend to be more highly selected for service than men and may obtain deferments on the basis of marriage or being a conscientious objector. Men serve in the reserve until they are 49 years of age and women until they are 30. One month of active duty per year is required of reserves.

At the age of 17 every Israeli young man and woman is required to register for military service at one of six Defence Force Centers throughout the country. A psychometric test battery is administered at the time of registration. At the age of 17½, a second visit is made to the registration center, where the potential conscripts are given a medical examination and interviewed. The interview is conducted by a line officer, not a psychologist, who has had several months of training in interview technique at Tel-Aviv University. There is no psychiatric examination during the screening process. At the

age of 18, men found acceptable for service are sent to the Induction and Classification Center at Haifa. In addition to a full basic test battery administered at this Center, the conscript undergoes classification testing. An "on the job" work sample is utilized to examine men who profess skill and specialized training in trades such as carpentry, electricity, etc.

Army Program: A group of psychologists working under Lt.-Colonel M. Bloom, a regular Army officer trained in psychology, is responsible for the maintenance of the basic selection battery for all Israeli enlisted personnel, Army officer selection, and psychological consultation service in the Army. The psychology test batteries for enlisted personnel do not differ markedly from those found elsewhere in the world and will not be described here.

The officer selection program is based on the old British War Office Selection Board (WOSB) procedure. Teams of observers, consisting of one psychologist and one Army combatant officer, rate officer candidates in the various WOSB field problems. It would appear that the problems thus have been modified very little from those used by the British during World War II. In addition, all officer candidates are evaluated in terms of intelligence, education, and psychosocial background. A highly important contribution to officer candidate selection is the fact that all of the candidates have served at least one year on active duty as enlisted men.

Bloom systematically collects data on the effectiveness of his rating teams in the WOSB type procedure. Approximately one-third of applicants for officer training survive the psychological selection procedure. Approximately 12% of men given the highest rating fail in training. It has been difficult to carry out the type of follow-up studies which might be desired on the effectiveness of the selection procedures. However, there are several procedures in the training program which indicate that the officer selection procedures do have validity, even though they do not possess the predictive powers which might be desired.

One of the most unique and intriguing programs of the Army group is that involving the assignment of psychologists to units or organizations in the field as consultants to the commanding officer. This program, which started approximately a year ago, combines the collection of research data and a more applied consultation function. The unit consultants screen all personnel who are newly assigned to their field unit, review

basic test battery scores, and advise on the optimal classification and assignment of the individual within the unit. They assist in the selection of noncommissioned officers, using sociometric techniques. In a study recently completed it was found that the field psychologist's recommendation is significantly more accurate than that of line officers and noncommissioned officers in the preliminary recommendation of individuals for officer candidate training. The field psychologists also conduct "discussion" groups concerned with supervisor-subordinate relationships and problems encountered by personnel in adjusting to the military service. Actually these discussions are conducted along the lines of group therapy sessions, although this clinical orientation is not made known to the participants.

It is intended that the field psychologists will be called upon to assist in developing a long-term sequential-classification procedure for the Army. In this connection they will be able to carry out formal psychometric testing of personnel in the field and collect criterion data.

The assignment of psychologists to positions in Army units is recognized as providing a built-in capability for follow-up studies. The primary problem encountered with this program to date is one of over-enthusiastic acceptance by the line commanders. Bloom and Eran are acutely aware of the dangers inherent in the possibility of line commanders developing unrealistic expectations and subsequently finding that the psychologists are not able to meet the demands made upon them.

Navy: Lieutenant B. Shalit is a career uniformed psychologist assigned to the Navy. Shalit is working on a PhD at the University in Jerusalem, although the overwhelming bulk of his professional work is of an applied nature. He is responsible for the selection of submarine, commando, and naval officer school personnel. Shalit, who himself has many of the physical and behavioral characteristics of a commando, reportedly is extremely well accepted by the Israeli Navy and his advice highly regarded. The selection procedures utilized in his group are highly clinical in orientation, and it would appear as if little systematic effort has been made to validate the contribution that any test procedure makes to the total battery or for that matter the battery itself. It is interesting to note that in the selection of commandos, Shalit employs a one-hour "Lilly" type of immersion along with a two-day group isolation situation.

While up to 60% of applicants for the Navy programs are rejected by Shalit, the men he accepts apparently perform well as there is little attrition during or after training. One receives the impression that Shalit is a most capable clinician

with an unusually comprehensive understanding of the psychological demands of the many programs with which he is concerned. Obviously, the techniques he employs work for him. At the same time, one wonders whether the results obtained in this program are so dependent upon Shalit as an individual that the program would collapse if he were to leave.

Air Force: Air Force pilots are selected by a medical board which employs psychiatrists and junior psychologists who administer tests and function generally to support the psychiatrists in their work.

A pilot test-battery and psychomotor tests were developed in the early 1950's. These are revised and updated from time to time. Work apparently is under way on the development of new eye - hand coordination tests. A civilian sociologist serves as a part-time consultant to the Air Force, doing work in the broad field of small group psychology. Work also is under way on the development of sequential selection procedures much along the lines used at the Naval School of Aviation Medicine at Pensacola. This entails the development of a multiple scoring system where data is added to a composite throughout training with a view towards providing information on the cadet's probability of success at various stages throughout training. Reportedly, this work has reached a stage where it has some practical value, although it is considered that the program will be considerably refined in the next few years.

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This report describes military psychology in the Armed Forces of Israel. It is based on a visit made approximately one month before the recent Israeli-Arab conflict.

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OFFICE OF NAVAL RESEARCH

BRANCH OFFICE LONDON ENGLAND

INTERNATIONAL CONFERENCE ON PSYCHOLOGICAL RESEARCH IN DEEP DIVING
Office of Naval Research Branch Office, London
22-26 May 1967

Captain John E. Rasmussen

17 August 1967

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INTERNATIONAL CONFERENCE ON PSYCHOLOGICAL RESEARCH IN DEEP DIVING

Office of Naval Research Branch Office,
London, England
22-26 May 1967

INTRODUCTION

The conference reported here represents somewhat of a departure from the traditional role and activity of ONR London. For over 20 years this office has had a major U.S. Government responsibility for scientific information exchange between the United States and Europe. While the missions of information exchange and fostering of advances in basic and applied sciences have been accomplished through a number of means, the primary mechanism has been through visits of ONRL liaison scientists to European universities and institutions, with the subsequent preparation of a report to the U.S. scientific community.

The meeting herein reported constitutes a new and different ONRL approach to enhancing information exchange and cooperative research activity. An attempt was made to bring together as many investigators as possible from various countries of the world who are working in a narrow, confused, but increasingly important research area -- the psychological aspects of deep diving.

The first papers reporting formal, systematic investigation in this area by psychologists were published less than ten years ago. Even though there has been a rapid expansion of deep diving activity within the past few years, both military and commercial, psychological research efforts have not developed at a commensurate rate. This is true even though it long has been known that humans may experience gross performance decrement and behavioral aberrations at depth. In fact, surprisingly little is known of the basic psychological variables involved, their interaction with physiological variables, or the specific limitations which they may place on man living and working at depth. The state of the art at present with regard to the psychological parameters of diving is such that there is confusion at even the most fundamental of issues, such as definition of key terms.

This Conference was organized and sponsored by ONR London with a multifold purpose:

(1) To exchange information on past, current, and planned psychological research activity in the area of deep diving.

(2) To give a broad perspective to this area of research and set forth goals which legitimately may be established. Here, it was hoped to identify and reach agreement on major variables and parameters as well as their fundamental definition.

(3) Consider basic problems of experimental design, methodology, criterion measure, etc., in the context of the research limitations imposed by the underwater and/or hyperbaric environment.

(4) Explore the possibility of an international cooperative effort in the development and standardization of instrumentation and measurement techniques.

(5) Develop uniform procedures for reporting data and experimental conditions in diving research.

(6) Explore the possibility of establishing an international data exchange program.

Invitations were extended to all known individuals from military, civilian, and industrial laboratories in the U.S. and Europe working on psychological problems associated with deep diving or hyperbaric atmosphere. A total of 12 persons, from three countries, accepted the invitation and participated in the Conference. When considered on an international basis, the participants represented approximately 90% of all psychologists identified with diving. A list of the participants, their addresses, and areas of research interest is contained in Appendix A.

PLAN OF CONFERENCE

Because of the nature of the meeting, no formal papers were prepared or presented, but each participant was requested to bring such data, reports, or other backup material he considered necessary to support technical positions which he might take during the course of the discussions. Four days were devoted to informal, semistructured discussion, with one day being set aside for a recap and summary. An agenda was prepared to serve as a general guideline for the discussion and to orient participants in their preconference planning and preparation. It was clearly understood, however, that the topics or issues set forth in the agenda were not intended to restrict the discussion. No rules were imposed beyond remaining reasonably well within the boundary of the general topic under consideration at the moment.

The meeting was opened by Captain C. T. Froscher, USN, Commanding Officer of ONR London, who made a few brief remarks welcoming the participants. Captain J. E. Rasmussen, MSC, USN, the psychology liaison officer at ONRL, served as general chairman and moderator for the meeting. It was planned that each session would be chaired by a different participant, but the plan was not followed throughout the Conference as some felt that this role limited their freedom of discussion. However, each of the predesignated session chairmen was responsible for preparing a general summary of the discussion immediately after his session was concluded. The agenda items included in each session and a summary of the general discussion are set forth below:

SESSION I -- PROBLEM DEFINITION

> "Conceptually, what are the goals or aims of psychological research in this area? What parameters are relevant to psychological study and diving performance? What is the role of psychological methodology in physiological studies of diver performance? What purely psychological problems are raised by diving? What are the relative priorities in this research area? What are the research payoffs? Are there other 'neglected' problems in this research area which should be considered?"

The session began with an attempt to identify the goals of psychological research as they relate to underwater activities. It was decided that one of the major aims initially should be to identify those psychological parameters which are unique, or highly accentuated, in the underwater environment. Some of these parameters will be discussed later.

A second major goal is the development of suitable psychological experimental methods for measuring performance in the rather diverse and difficult situations encountered. As will be discussed subsequently, some of the standard techniques, both experimental and statistical, are not readily adaptable to underwater work.

Another goal is the application of laboratory results to field situation and the identification of basic problems in the field which can result in redirecting the course of laboratory studies.

It was also emphasized that inasmuch as it is hard to separate psychological and physiological problems in diving research, an interdisciplinary approach is absolutely essential.

The following are not intended to represent a complete list, but these factors were considered by the group to be most relevant to performance and its measurement:

Environmental	Equipment	Psychological
Pressure	SCUBA	Experience
Buoyancy	Diving Mode	Team composition
Temperature	Mask	Task difficulty
Viscosity	Gas mixture	Potential danger
Water movement	Instrumentation	
Marine life	Diver communication	
Visibility		

In discussing the role of psychological methodology in physiological studies, the importance of an interdisciplinary approach again was emphasized. It also was stressed that "undersea" psychologists can provide some of the tools for gathering physiological data as well as suggesting what data need be collected. Likewise, diver performance cannot be understood without the basic data provided by physiological tests. This is true not only for research purposes, but also for planning and executing military missions involving diver skills.

Further discussion of underwater tests themselves led the group back to more fundamental questions: What do we want to measure? Why? What are the major research questions before us? What are the main areas in which psychologists can contribute? It was felt that a group should attempt an attack on these questions before involving itself with the details of tests and technique. In fact, it was felt that some preliminary answers to these more basic questions would provide a framework within which to discuss experimental techniques and their relative merits. Consequently, a list was generated of major psychological problem areas in diving. The areas included were:

(1) Cognitive behavior

(2) Motor behavior

(3) Individual differences (highlighting behavioral aberrations, apprehension, and experience)

(4) Social behavior

(5) Perceptual change

(6) Restricted sensory input

The research payoffs in diving research were considered fairly obvious. In addition to adding to our store of fundamental knowledge regarding human behavior, there are a number of specific ways in which the study of diver performance can be beneficial. Some of these are as follows:

(1) Increased overall performance effectiveness

(2) Improved equipment design

(3) Improved selection procedures

(4) Improved team effectiveness

(5) Advance scientific diver capabilities

(6) Increased sophistication of military missions involving divers

(7) Improved search, rescue, and salvage capability

(8) Modification of swimmer and diver training programs

A general discussion of stress ensued on the first day, ending in an attempt to identify stress factors which are unique or highly accentuated by the underwater environment. It was generally agreed that although there are unique factors contributing to stress underwater, i.e., marine life, gas mixture, etc., the overall problem is not basically different from other hazardous or difficult situations.

Throughout the discussion, several attendees cautioned the group about going "witch-hunting" with regard to looking for problems where, in fact, none existed. It is all too easy to assume that there will be difficulties in areas in which one's own interests lie. Along these same lines it was suggested that we examine problems, taking into account whether or not they are immediately solvable. Two examples given here were nitrogen narcosis, which can be avoided by using proper gas mixtures, and cold, which can be alleviated by heated suits. On the other hand, it was pointed out that although such solutions are technically available, they cannot always be used due to cost or equipment availability; and, in addition, certain penalties often are paid for such solutions. This led to some lengthy discussions of basic versus operational investigations.

A 25-minute film was then shown by Dr. Adolfson on the effect of nitrogen narcosis on behavior. In addition to demonstrating specific performance degradation, this film revealed a sharp contrast between the effects of narcosis(?) on an experienced person (the experimenter) and an inexperienced one (the subject). There was a remarkable difference in behavior (the experimenter being relatively unaffected) indicating a strong psychological component in narcosis or physiological response down to depths of 120 meters.

The discussion then shifted to the types of jobs that can best be done by divers as compared to operating from the surface or from submerged vehicles. The diver's contributions pointed out were scientific, such as studying marine animals, bottom-ripple observation, work tasks requiring fine manipulation, general flexibility, decision making, etc. It was emphasized that man's performance limitations must be established in order to determine the point at which submerged vehicles become more effective (cost and performance) than a free swimmer.

SESSION II -- RESEARCH METHODOLOGY

"What are the problems and pitfalls in the design of psychological research in diving, e.g., interaction, asymmetrical transfer, and learning effects, adaptation, etc.? What techniques can be devised to deal with the logistic constraints in diving? What is the role of the experimenter or investigator in diving research, e.g., problems of experimental participation versus nonparticipation? Is it possible

to develop a sequence of designs of decreasing complexity to meet unexpected changes in operational conditions during the course of the experiment? What are the methodological problems associated with: (a) precise experiments aimed at testing theory; and (b) field experiments concerned with establishing performance limits?"

Two types of experimental task were distinguished, those concerned with the more immediate task of establishing performance limits in practical situations, and those concerned with more theoretical questions. It was agreed that applied experiments should be concerned only with major effects. In the more theoretical studies small effects may be important, and here experimental design (which is always important) is likely to be even more crucial.

Two major problems of design were discussed: (1) Problem due to the subject's expectations. Dr. Greenwood reported a study replicating the results of Kiessling and Maag on impairment at pressure, but showing that no impairment occurred (even at 300 ft) when subjects were not aware of the depth. Dr. Baddeley reported a study showing significant impairment at normal atmospheric pressure when subjects believed themselves to be at high pressure, though this effect was significantly less than that shown at 4 atm. (2) Problem due to practice and transfer effects. Improvement due to practice during the experiment may complicate the picture, especially when transfer across conditions is not symmetrical. It was agreed that, where possible, subjects should be thoroughly practiced before starting the experiment.

The problem of producing robust experimental designs to allow for the contingencies of field experimentation was discussed. Suggestions included: (1) Collapsing a range of conditions, such as temperatures, into two classes; (2) Where the same subject is used in all conditions, checking for undesirable transfer effects by comparing the general pattern of results with that based only on the first test from each subject; (3) Suggested rules for filling in incomplete data, e.g., from a partially completed articulation test; and (4) The value of having alternative experimental plans available.

There was considerable discussion on the role of the experimenter. Views differed, ranging from the contention that he should remain on the surface and never act as a subject in his own experiment to the view that his participation was highly desirable.

The question of whether subjects should always be experienced divers was raised. It was agreed that this is in general desirable, but that novices may be useful for some studies, e.g., training or looking at anxiety effects, though there was a suggestion that experienced divers showed a different pattern of anxiety than novices. The need for techniques to manipulate threat of danger was discussed and the resulting ethical problems considered.

A number of additional research problems were discussed. These included:

(a) Techniques for controlled observation of practical tasks. Mr. Miller outlined the salvage program planned for SEALAB III and various sampling and recording procedures were discussed.

(b) The performance of divers in pairs and in groups. It was agreed that this is an urgent and potentially fruitful problem, which, in turn, is crucially dependent on the next point.

(c) Communications between divers. The need for better voice communications is generally felt to be vital. It was pointed out that this, in turn, interacts with visibility.

(d) Visibility. More research is needed on the effects of poor visibility on performance. Possible techniques for experimental manipulation of visibility were discussed.

(e) What is the appropriate baseline condition? Opinions differed as to whether dry land performance was relevant or whether the baseline should always be performance in good visibility, warm, shallow water.

SESSION III -- EXPERIMENTAL TECHNIQUES

> "Is it possible to develop: (a) an agreed-upon or standard battery of performance tests, and (b) a set of techniques for analyzing operational tasks? What criteria should be used (validity, reliability, learning effects, practicability, etc.) in the selection of experimental tasks? Is it possible to agree upon which variables should be controlled or at least recorded in experiments? What additional complications are introduced by open sea research?"

The session began with two demonstrations:

(1) Mr. Parker presented a film showing the usefulness of underwater problems for the solution of zero-gravity design problems in the aerospace program. The sequence of walking on the ocean (moon) bottom suggested particularly well the correspondence between the two situations, and the additional usefulness of this type of study in highlighting purely underwater problems. The transfer of aerospace technology to underwater work was discussed, and it was agreed that advantage could be taken of the physiological monitoring equipment developed in the space program. EEG measurement techniques and self-contained recorders were identified as potentially valuable. The space-diving trade-off was readily apparent in the discussion.

(2) A record was played demonstrating surface-to-diver and diver-to-surface voice communication over an Aquasonics communications system incorporating automatic gain control. Diver speech was fairly intelligible up to a range of 400 yards at a maximum depth of 45 feet. (Dr. Tolhurst reported that the word intelligibility for this system was about 64%.) It was agreed that there was room for improvement, and suggested that some improvement had been effected in more recent Aquasonic equipment.

Discussion of the session topic proper began with the consideration of test standardization. Several points were made, including the futility of standardization for its own sake. Dr. Bowen stressed the application of "on-line" tests to operational situations, a technique he felt superior to "off-line," artificially imposed tasks. There was general agreement on this point.

A major share of the day's discussions was devoted to an exploration of the six psychological problem areas outlined in the first session of this report.

COGNITIVE BEHAVIOR - It was recognized that many aspects of cognition exist -- judgment, memory, reasoning, information processing.

Dr. Baddeley described a test based on linguistic concepts which he had just recently applied. In it a sentence describes a relationship between a pair of letters, and the subject marks the sentence true or false. This test aims at the same general area of cognition as the set exceptions test subsequently described by Dr. Bowen, but may prove more sensitive. Dr. Adolfson exhibited a Swedish version of the Stroop word-color test, a cancelling test and the Wechsler-Bellevue digit-symbol test currently being used in SEALAB III training.

It was accepted that tests should not be used because they are easy to administer -- often a temptation -- and that attempts should be made to devise cognitive tests more closely related to and integrated with the operational situations. Tests of practical diving judgments were identified as particularly important.

In finishing the discussion on cognition, a survey was made of the cognitive functions that are important in diving and which have not yet received much research attention. Further development is desirable in the fields of:

(a) Sequentially dependent tasks (i.e., each succeeding subtask is defined, at least in part, by the nature of the previous subtask).

(b) Adaptive flexibility, particularly in the sense of coping with unexpected or contingency situations.

(c) Group/individual self-assessment; a checklist approach was thought to offer promise.

(d) Attentional proneness; vigilance, scanning, time-sharing, etc., as a function of task multiplicity, load, environmental or physiological stress, etc.

(e) Memory; short-term and long-term memory. (It is noted that some observational and experimental data presently exist but are far from being definitive.)

MOTOR BEHAVIOR - This area was separated into several subareas: (a) mobility, (b) work position in the water, (c) manual dexterity, and (d) work output. A number of influential variables were identified. These included water factors (such as cold, buoyancy, visibility, movement, viscosity), respiratory and circulatory chemical factors, and experiential factors.

Because quite a few of the participants are active in the investigation of fine manual dexterity in diving, this subarea was discussed in some detail. Several tests for the measurement of fine dexterity were presented and commented upon. A good test should be simple, "captive" or resistive to gross failure (such as dropping parts in the water), and insensitive to learning effects. It was generally agreed that if some defects could be eliminated, particularly the tendency to drop and lose nuts, the screw plate test (a test requiring subjects to reverse nuts and bolts) might well provide a form of international basic standard, even though other tests would still be used for special problems.

Gross motor behavior presents a more complicated investigative picture because it involves both diverse aspects (carrying, force application, assembly, etc.) and finer elements (for example, it is hard to imagine a practical gross motor activity which does not also require fine motor activity, major perceptual activity, and so forth). Dr. Weltman described a pipe-assembly task now under development that utilizes flanged 2-inch pipe which can serve as an experimental vehicle for the examination of motor activity and team effort. Dr. Miller reported some preliminary work by Dr. Streimer of North American Aviation in the field of underwater force application.

Criteria guiding the selection or development of psychomotor tests were discussed. The following five criteria seemed most critical to satisfy:

(1) Simplicity of administration -- both in terms of the experimenter's tasks and the subject's tasks.

(2) Reliability in terms of avoiding variability in subject's method of doing the task or strategy for approaching the task.

(3) Sensitivity in differences to stimulus in terms of subject.

(4) Minimum of training time and learning time.

(5) Validity, through use of "job sample" types of tests.

The group further agreed that, where possible, psychomotor test equipment might be modified in order to find better methods and equipments.

INDIVIDUAL DIFFERENCES - A number of related topics were subsumed in the discussion under this broad heading. They ranged from identification of behaviors important in diving performance, through personnel selection, emotional and intellectual function problems related to hyperbaric atmospheres, to diving training. Three major points emerged early in the discussion and set the tenor of the whole session. In and of themselves these points are rather obvious and certainly not remarkable. On the other hand, it was equally apparent that in spite of their fundamental importance those points had not been clearly verbalized or explicitly set forth previously in connection with this research area. They may be summarized as follows:

To date, minimum attention has been given to personnel selection in diving research. "Self-selection" has been the means through which individuals become involved in diving activity. However, it is anticipated that selection programs will be required in the very near future because of the greatly increased use of divers, both commercial and military. Before a meaningful selection program can be developed, it is necessary to obtain an understanding of and factual knowledge about individual differences which are important in diving performance.

Considerable time was devoted to the discussion of two major determinants of individual difference in diving which are of paramount importance, although almost completely neglected to date: the type and extent of diving experience, and the nature and degree of diver apprehension or anxiety. It was the consensus among the participants, who themselves are experienced divers, that these two factors probably contributed the largest sources of unaccountable variance in diving research reported to date. That view was reinforced by recalling the movie shown by Dr. Adolfson on the first day of the meeting which revealed extreme behavioral differences between experimenter and subject at 10 atm.

This discussion led to the third major point: the need for agreement regarding the descriptive information or data which should be recorded on all subjects and reported in the literature. In essence, the issue here is determination of the nature and amount of information on subjects which is required to interpret and compare research findings meaningfully.

It was proposed that a standard form should be devised to record specific descriptive information to include: body fat, ponderal index (height, weight), physical defects, age, sex, visual acuity, vital capacity, education, occupation. It was agreed that diving experience should be recorded in a standard fashion. Information in this area would include: total number of dives, number of dives in the situation under investigation, accident history (bends and other types of diving accidents), and a judgment as to the relevance of past experience to the present situation. Further, because of extreme individual differences frequently encountered in this research area, it was agreed that investigators should report both the range and standard deviation (where applicable) of test scores.

In discussing anxiety or apprehension, it was agreed that all experimenters should be encouraged to obtain some index of the diver before, during, and after dives. A major problem here is the fact that techniques for evaluating apprehension are markedly dependent upon the capability of each research establishment. Among objective techniques considered to be of possible value are physiological measures such as heart rate, tachycardia, and hypergranulation. In addition, the possibility of using ratings or scaling procedures was discussed. Particular note was taken of the desirability of involving specialists in clinical psychology and psychiatry in this aspect of diving research.

The participants considered the separation of selection and training to be unrealistic. Moreover, there was a general feeling that training programs probably serve as the best selection devices obtainable at present. While most persons in practice select themselves in or out of diving programs, it was hoped that data on expressed attitudes would be collected whenever possible. Of more immediate concern is the problem of group composition where limited populations are available. Selection in terms of commonality of motivation, professionalism, and skill level, should be studied. In fact, group selection was considered sufficiently important to constitute a separate broad research area.

SOCIAL BEHAVIOR - In the general discussion of group behavior, Dr. Rasmussen mentioned the importance of distinguishing between active and passive groups in terms of the social interaction that takes place. Thus, group problems in SEALAB-type programs may differ markedly from those in salvage diving. There was a general feeling that we should observe groups of divers going about the natural tasks that may come about in the course of doing experimental studies. Some special group tasks were discussed, and the possibility of using underwater search problems for groups was mentioned. This would require each member to coordinate his activities with others in the group to avoid redundancy and ensure complete coverage.

The various special issues for study were defined as:

(a) Work effectiveness

(b) Compatibility

(c) Cohesiveness

(d) Professionalism

(e) Team organization in terms of:
- supra and subordinate relationships
- decision making processes
- optimal networks
- amount and kind of work
- training as a social unit
- communication processes

There was considerable discussion of each of these topics. It was the general feeling that because diving is essentially a group activity, studies of group behavior should be a prime target of research.

PERCEPTUAL CHANGE - Since almost every perceptual mechanism is affected by submergence, it is important to consider not only physical changes underwater but also the effect of the diver's adaptation to these changes. The group identified three main areas of research needed in perceptual change in diving. These are:

(a) Basic sensory performance. It was agreed that information presently available on basic sensory ability underwater is inadequate for human factors design needs. This situation cuts across many sensory modalities: vision, hearing, tactile sensation, middle ear sensation, etc. It was agreed that when sufficient data become available, a handbook for underwater use, similar to the Bioastronautics Data Book, would be highly useful.

(b) Spatial perception. Discussion centered around the many variables involved, such as vision (including color, distance, and acuity), hearing, and geographic orientation. Dr. Ross pointed out that water cloudiness and light effects tend to offset the apparent shortening of distances due to refraction and frequently cause the diver to assume that objects are farther away than they actually are.

(c) Perceptual narrowing. This phenomenon, observed by Dr. Weltman and others in laboratory settings, appears to have significance in practical diving situations. Dr. Vaughan mentioned an instance of its apparent occurrence in control of a swimmer delivery vehicle. In discussing the methodology of measuring perceptual narrowing, several areas of cross applicability were discovered among different projects, and it was agreed that those involved would individually explore these further.

It was agreed that time perception is affected possibly by cold as well as inactivity. Some possible methods of offsetting the deleterious effects of this phenomenon were mentioned.

Social perception also was mentioned. SCUBA equipment imposes severe limitations on team cooperation and nonverbal communication, making it difficult to recognize emotions in teams and groups. Discussion revealed that while this is an interesting factor, it is probably not of paramount significance, and also is likely to improve along with auditory communications.

ENVIRONMENTALLY RESTRICTED SENSORY INPUT - It was recognized that the water environment is different from the terrestrial environment in many particulars and has the effect of decreasing the richness and variety of one's knowledge about the environment. When, as is often the case, relative sensory invariance is present, boredom and monotony may be prime determinants of behavior. Cold, in particular, is a primary cause (but not the only cause) of subjective time distortion.

Another feature of the diving environment is that it generally impoverishes and/or changes normal sensory feedback and knowledge of results. To the extent that this impairs performance, tasks and procedures may have to be designed to provide amplified feedback.

This problem area is not unique to diving, research is going on elsewhere. While building on such studies, diving experiments should attend to the unique causative factors which bring about these effects in the diving situation.

HUMAN ENGINEERING - The group did not address itself specifically to human engineering or man/machine system issues. However, there were frequent references to present inadequacies in equipment design and the lack of studies through the sequence of donning equipment, preparing to dive, diving and performing tasks, ascending, and cleaning up. Some incidents and accidents were thought to have been due to equipment inadequacies in terms of the human interface with the equipment, rather than simply to equipment malfunction. The penalty that is incurred by the need for overtraining on poorly designed equipment was also mentioned. Among the pressing problems is the development of equipment, communication equipment in particular, to allow groups to be more work-effective. While little was specifically said about man/machine system development, Dr. Vaughan mentioned that poor layout of displays on a manned prototype submersible caused impairment of navigation.

It was agreed that at the next meeting the topics of equipment design, human engineering and man/machine system development should be included in the agenda.

SESSION IV -- ESTABLISHMENT OF DATA EXCHANGE PROGRAM

Because so few psychologists are working in the area of diving research and because data are so difficult and expensive to collect, there is a critical need for expedient exchange of information among active investigators. This need was considered to be of sufficient magnitude to justify devoting a specific session of the Conference to discussion of problems in information and data exchange.

Dr. J. W. Miller volunteered the services of his office in ONR, Washington, as a data and information exchange center. One of the major tasks of this center will be to accumulate test data on instruments used in diving research with a view toward obtaining samples of sufficient size to develop norms.

The idea of a newsletter as a mechanism to exchange information evolved during the course of the discussion. Dr. Miller agreed to publish such a newsletter with the understanding that material would be submitted in a form which could be reproduced and published with a minimum of editorial effort.

The following types of information will be included in the newsletter: summaries of partially completed studies, abstracts of studies which produce negative results, abstracts of research which is proposed but not yet under way, information on equipment and tests currently being developed, and new developments in research technique and methodology.

Distribution of the newsletter will not be restricted, and copies will be sent to anyone working in psychological problems associated with diving, at their request. It was agreed that the deadline for the first issue will be 1 October 1967 and that all contributions should be forwarded to Dr. James Miller, Head, Engineering Psychology Branch, Office of Naval Research, Department of the Navy, Washington, D.C. 20360.

At the suggestion of Dr. Adolfson, Dr. Miller agreed to use his office as a center for exchanging documentary films made during the course of research activities.

SESSION V -- CONFERENCE SUMMARY AND CONCLUSIONS

As the Conference progressed, discussion became more active and the meetings actually continued one day beyond the time which had been planned. The final summarizing session was probably the most active of all. In fact, the agreements reached during this session were so numerous that they are difficult to record. Although the author has served for three years as a liaison scientist in the London Branch of the Office of Naval Research, the spirit of international cooperation and agreement shown during the last day of this meeting exceeds anything witnessed to date.

It was agreed that the only logical means of progressing in this research area is by close cooperation, adaptation of common or standard experimental procedures, and standardization of test instruments. In this connection, the participants considered it desirable that two manual dexterity tests, one using tools and the other fingers, be recommended for use in diving research. Standardized conditions of administration should be developed for these tests and appropriate norms devised. The Bennett Hand-Tool Test was selected as one instrument. Standardized drawings and instructions for this test will be distributed to participants by Dr. Miller. He will coordinate the development of norms using data collected under standardized conditions by various investigators.

A modified version of the screw-plate test was selected for the manual dexterity instrument involving use of fingers. Mr. Parker agreed to ask engineers at General Electric to prepare drawings and specifications for a modified screw-plate test. Dr. Adolfson indicated that it would be possible to fabricate several of the tests in the Swedish Navy instrument shops, and Mr. Bowen of Dunlap will develop instructions and standardized conditions for administration of the new tests.

The Wechsler-Bellevue Digit Symbol Test, now being used in SEALAB III, appears to be useful in diving research. In order to be utilized, the test

must be embossed on plastic sheets. Dr. Miller agreed to provide the basic stimulus materials and Dr. Wilton-Davies indicated that the Royal Naval Physiological Laboratory could fabricate a number of sample sets.

Several general conclusions were reached on experimental technique and methodology. It was generally agreed that nonparametric statistics are preferable in diving research because of the small number of subjects and sampling difficulties encountered in this area. It was further agreed that extreme care should be utilized in interpreting results of research in the literature, where small samples are involved and decisions and interpretations are made on the basis of evidence which might not be particularly solid. It was agreed that extreme cases should be reported because of the significance of individual differences in diving research. Moreover, this field is still in a sufficiently early stage of development that single case observations are worth reporting.

A number of points were agreed upon in considering criterion problems. Test/re-test reliability should always be ascertained and reported before an attempt is made to utilize newly developed test instruments. Strange as it may seem, this practice has not been followed in much of the diving research published to date. Further, pilot study data should always be reported on new tests. In the same vein, learning effects and information regarding training on new test instruments should appear in any reports of studies utilizing instruments. It was agreed that particular emphasis should be given to the accumulation of information on the validity of tests using diving.

The participants requested that the Office of Naval Research sponsor another conference, patterned along the lines of the one reported here, in approximately one year to 18 months. It was agreed that plans will be made to hold such a meeting in the fall of 1968. Dr. Adolfson indicated that the Royal Swedish Navy may wish to serve as host for the next meeting. It further was agreed that the agenda should cover the same topics as at this Conference, although an additional session should be added to cover the area of Human Engineering.

A list of the Conference participants is contained in Appendix A. Appendix B sets forth references to tests used in diving research. One of the final decisions of the meeting was that the participants would forward such references as they may have to the Conference chairman so that they could be appended to the report. The material contained in Appendix B was received from Drs. Miller and Baddeley.

APPENDIX A

INTERNATIONAL CONFERENCE ON PSYCHOLOGICAL RESEARCH
IN DEEP DIVING
22-26 May 1967

PARTICIPANTS	RESEARCH INTERESTS
Dr. John A. Adolfson Royal Swedish Navy Långa Raden 2 Stockholm 100 Sweden	"Nitrogen" narcosis and its effect on performance using air to depth of 120 meters. Dr. Adolfson pointed out the necessity for such studies because of the unavailability of helium in Sweden
Dr. Alan D. Baddeley M.R.C. Applied Psychology Research Unit Cambridge, England	Experimental design for studies of performance both in chambers and in the open sea. In particular the study of diver tasks encountered during scientific diving operations at depths less than 200 feet on air
Dr. Hugh M. Bowen Dunlap & Associates Darien, Conn., U.S.A.	The development and administration of motor and cognitive performance tests to study the effect of cold water
Mr. M. Greenwood Deep Submergence Systems Project Technical Office 139 Sylvester Road San Diego, Cal., U.S.A.	The study of diver performance in real life situations such as Sealab, salvage, etc.
Dr. James W. Miller Code 455 Office of Naval Research Department of the Navy Washington,D.C., U.S.A.	The administration of a contract program on diver performance and the conduct of the diver performance for the Sealab program
Mr. Fred Parker General Electric Co. MSD-UFSTC P.O. Box 8555 Philadelphia, Pa., U.S.A.	The use of underwater simulation as a means of studying extra-vehicular activities during space-flight. In particular physiological responses such as EEG and EKG are of interest and how these, such as oxygen consumption, as well as other measurements, using micro miniaturized sensing and recording techniques, may be applicable to deep diving research

PARTICIPANTS (Contd)	RESEARCH INTERESTS (Contd)
Dr. Helen E. Ross Department of Psychology University of Hull Hull, England	The visual processes as affected by the underwater environment such as depth perception, distance judgment, adaptation and visual acuity
Dr. G.C. Tolhurst Code 454 Physiological Psych.Branch Office of Naval Research Department of the Navy Washington, D.C., U.S.A.	Diver communication and genera. psychophysiological problems
Dr. W.S. Vaughan Whittenburg, Vaughan Associates Alexandria, Va., U.S.A.	The measurement of diver performance in operational settings, particularly during the operation of wet (water filled) swimmer delivery vehicles
Dr. Gershon Weltman University of California, Los Angeles Dept. of Engineering Los Angeles, Cal.,U.S.A.	Development of methodology for measuring performance underwater both in tanks and open sea, with emphasis on perceptual narrowing over psychophysiological measurements
Mr. Colin Wilton-Davies Royal Navy Physiological Laboratory Alverstoke, Hants. England	Underwater telemetry of physiological responses, particularly with regard to developing techniques for obtaining such data on a non-interference basis

Chairman: Captain J.E. Rasmussen, MSC, USN
Office of Naval Research Branch Office, London

APPENDIX B

References for Tests Used in Diving Research

Screwplate Test

A. D. Baddeley, "The influence of depth on the manual dexterity of free divers," J. appl. Psychol. 50, 81-85 (1966)

Addition Test

A. D. Baddeley, "The relative efficiency of divers breathing air and oxy-helium," Underwater Assoc. Symp. 1, 13-19 (1965)

Digit Copying Test

D. Legge, "Analysis of visual and proprioceptive components of motor skill by means of a drug," Brit. J. Psychol. 56, 243-254 (1965)

Sentence Checking Test

A. D. Baddeley, J. W. De Figueredo, J. W. Hawkswell-Curtis, and A. N. Williams, "Nitrogen narcosis and performance underwater," Ergonomics (In Press).

Tests of Perceptual-Motor Skills

The following list of tests of perceptual-motor skills contains (a) test names in alphabetical order, (b) factor names on which the tests load, (c) one or more factor loadings reported in the literature, and (d) associated literature references.

	A
TEST	FACTORS, LOADINGS, AND REFERENCE
Aerial Orientation*	Spatial Orientation (SO) (.61, 4) (.52, 18)
Aiming (Ai)*	Aiming (Ai), (.63, 2)(.36, 7) (.57, 9) Finger Dexterity (FD) (.12, 2) (.35, 7) (.30, 9) Wrist-Finger Speed (WFS) (.45, 2) (.52, 9)
Analog Addition Electronic (AAEl)	Control Precision (CP) (.31, 17) Movement Analysis (MA) (.22, 17) Single Integration/Differentiation Specific (.23, 17)
Analog Addition Mechanical (AAMech)	Ability to Deal with Rotational Magnitudes (.33, 17)
Analog Addition Pr. (AAPr)*	Ability to Deal with Linear Extents (.57, 17)
Arm Drift	Arm-Hand Steadiness (AHS) (.31, 5)
Arm Tremor	Arm-Hand Steadiness (AHS) (.36, 5)
Athletic Experience Scale*	Athletic Experience (General) (.89, 8) Athletic Experience (Specific)(.32, 8)
Athletic Versatility Index*	Athletic Versatility Index (.64, 8) Athletic Experience Specific (.45, 8)
Auditory Reaction Time (ART)	Reaction Time (RT) (.68, 2) (.63, 6) (.68, 12 (.51, 18)
	B
Bimanual Matching (BM)	Control Precision (CP) (.37, 18)
	C
Choice Reaction Time (CRT)	Response Orientation (RO) (.39, 18)
Circle Dotting (CD)*	Aiming (Ai) (.69, 15)

* Signified a printed test.

TEST	FACTORS, LOADINGS, AND REFERENCES
Compensatory Balance (CB)	Rate Control (RaC) (.39, 11) Control Precision (CP) (.32, 11) Manual Dexterity (MD) (.31, 11)
Complex Coordination (CC)	Multilimb Coordination (MC) (.30, 6) (.38, 18) Response Orientation (RO) (.44, 3) (.43, 4) (.09, 6) (.22, 11) (.23, 18) Spatial Orientation (SO) (.13, 3) (.40, 4) (.45, 12) (.34, 18) (.46, 7) (.39, 10) (.16, 11) Control Precision (CP) (.36, 2) (.45, 3) (.35, 6) (.44, 7) (.47, 10) (.50, 11) Speed of Arm Movements (SAM) (09, 2) (.37, 3) (.21, 6) (.09, 7) (.37, 10) (.09, 18)
Complex Movements, Printed*	Visualization (V) (.32, 11) (.34, 18) Integration (.30, 18)
Complex Multiple Reaction	Response Orientation (RO) (.41, 11)
Control Adjustment (CA)	Control Precision (CP) (.46, 6)
Control Movement, Estimate	Position Estimation (.48, 5)
Control Movement, Respond	Position Reproduction (.32, 5)
Controls Orientation	Visualization (V) (.36, 11) Spatial Orientation (SO) (.46, 11)
Control Sensitivity (CS)	Control Precision (CP) (.38, 18)
Coordinate Movements, Printed*	Spatial Orientation (SO) (.36, 11) (.36, 18) Visualization (V) (.36, 11) Integration (.30, 18)
Coordination, Printed*	Perceptual Speed (PS) (.42, 11)
Cox Eye Board	Arm-Hand Steadiness (AHS) (.47, 15)
	D
Decoding*	Numerical facility (.35, 10)
Dial Setting	Control Precision (CP) (.40, 6) Response Orientation (RO) (.43, 6)
Dial and Table Reading*	Mechanical Experience (.30, 10) Numerical Facility (.60, 10) Perceptual Speed (PS) (.32, 10)

TEST	FACTORS, LOADINGS, AND REFERENCES
Direction Tracing*	Position Reproduction (.39, 5)
Direction Control	Spatial Orientation (SO) (.34, 4) (.39, 11) (.24, 18) Response Orientation (RO) (.58, 4) Visualization (V) (.44, 11) (.34, 18)
Directional Control (DlCPr)*	Integration (.30, 18) Spatial Orientation (SO) (.38, 11) (.34, 18) Visualization (V) (.34, 11)
Discrimination Reaction Time (DRT)	Manual Dexterity (MD) (.10, 2) (.34, 11) (.01, 18) Response Orientation (RO) (.28, 3) (.53, 4) (.67, 6) (.50, 11) (.29, 18) Spatial Orientation (SO) (.38, 3) (.38, 4) (.72, 7) (.52, 10) (.37, 11) (.33, 12) (.14, 18) Speed of Arm Movement (SAM) (.05, 2) (.46, 3) (-.03, 6) (.25, 10) (.07, 18) Visualization (V) (.16, 3) (.23, 10) (.10, 11) (.34, 18)
Discrimination Reaction Time (Pr)*	Manual Dexterity (MD) (.26, 2) (.34, 9) (.04, 11) (.15, 18) Perceptual Speed (PS) (.35, 10) (.14, 18) Response Orientation (RO) (.42, 4) (.52, 6) (.41, 11) (.38, 18) Wrist-Finger Speed (WFS) (.14, 2) (.30, 9)
Double Differentiation (El)	Movement Analysis (.22, 17)
Double Differentiation/Integration (Mech)	Movement Prediction (.43, 17)
Dowel Manipulation	Manual Dexterity (MD) (.60, 1) (.40, 15)
Dynamic Balance (DB)	Control Precision (CP) (.35, 2)
	E
	(none)
	F
Following Directions*	Preceptual Speed (PS) (.31, 18)
Forced Landings*	Mechanical Experience (.35, 18) Response Orientation (RO) (.36, 18)
Formation Visualization*	Spatial Orientation (SO) (.51, 4) Visualization (V) (.58, 4) (.61, 18)

TEST	FACTORS, LOADINGS, AND REFERENCES
	G
General Mechanics*	Mechanical Experience (.64, 3) (.81, 7) (.62, 10) (.47, 18) Visualization (V) (.09, 3) (.06, 10) (.38, 18)
	H
Hand Precision Aiming (Corrects)	Speed of Arm Movement (.14, 2) (.56, 9)
Hand Precision Aiming (Errors)	Speed of Arm Movement (.01, 2) (-.51, 9)
Height	Athletic Experience Spec. (.32, 8) Dynamic Strength (-.39 ,8) Static Strength (.42, 8) Trunk Strength (-.31, 8)
Hex-Nut Steadiness	Arm-Hand Steadiness (.42, 15)
	I
Instrument Comprehension*	Mechanical Experience (.19, 3) (.41, 7) (.16, 10) (.16, 18) Perceptual Speed (PS) (.29, 3) (.15, 7) (.35, 10) (.15, 18) Spatial Orientation (SO) (.49, 3) (.69, 4) (.50, 7) (.46, 10) (.37, 12) (.47, 18) Verbal Comprehension (.36, 12) (.24, 18) Visualization (V) (.38, 18)
Irregular Dotting Pursuit	Aiming (.82, 15)
	J
Jump Auditory Reaction Time (JART)	Reaction Time (RT) (.64, 6) (.70, 12) (.48, 18) Speed of Arm Movement (SAM) (.44, 6) (.31, 18)
Jump Visual Reaction Time (JVRT)	Speed of Arm Movement (SAM) (.73, 2) (.54, 6) (.73, 12) (.52, 18)
	K
Knob Positioning Estimate	Position Estimation (.42, 5)
Knob Positioning Respond	Position Reproduction (.34, 5)

TEST	FACTORS, LOADINGS, AND REFERENCES
	L
Large Tapping*	Speed of Arm Movement (SAM) (.21, 2) (.39, 9) Wrist-Finger Speed (WFS) (.74, 2) (.75, 9)
Log Book Accuracy*	Numerical Facility (.31, 10)
	M
Marble Board	Manual Dexterity (MD) (.51, 15)
Marking Accuracy*	Aiming (.37, 2) (.40, 7) Spatial Orientation (.35, 10) (.34, 18)
Mechanical Comprehension*	Mechanical Experience (.61, 3) (.49, 10) Visualization (V) (.38, 18)
Mechanical Principles*	Mechanical Experience (.61, 3) (.49, 10) Verbal Comprehension (.43, 12) Visualization (V) (.40, 3) (.41, 4) (.41, 10)
Minnesota Rate of Manipulation (Placing)	Aiming (Ai) (.34, 9) Finger Dexterity (FD) (.31, 2) (.37, 9) (.36, 18) Manual Dexterity (MD) (.73, 1) (.32, 2) (.53, 9) (.38, 18) Speed of Arm Movement (SAM) (.36, 2) (.24, 9) (-.13, 18)
Minnesota Rate of Manipulation (Turning)	Finger Dexterity (FD) (.34, 2) (.34, 9) (.27, 18) Manual Dexterity (MD) (.61, 1) (.38, 2) (.52, 9) (.40, 18)
Motor Judgment	Rate Control (.40, 6) Control Precision (.40, 6)
Multidimensional Pursuit Bank and Altitude	Rate Control (RaC) (.37, 6) Control Precision (.32, 6)
Multidimensional Pursuit Bank and Air Speed	Response Orientation (RO) (.31, 6)
Multidimensional Pursuit Banking and Heading	Response Orientation (RO) (.41, 6) (.23, 11)
Multidimensional Pursuit Banking, Heading and Air Speed	Response Orientation (RO) (.33, 6)

TEST	FACTORS, LOADINGS, AND REFERENCES
Multiplication by a Constant (PR)*	Ability to deal with linear extents (.60, 17)
Multiplication by a Constant (Mech)	Ability to deal with rotational magnitudes (.45, 17)
Multiplication by a Constant (Electronic)	Movement Analysis (.21, 17) Multiplication by a constant specific (.41, 17)
	N
Nut and Bolt	Finger Dexterity (FD) (.39, 15) Mechanical Experience (.32, 10)
Numerical Operations II*	Numerical Facility (.66, 10)
	O
O'Connor Finger Dexterity (OFD)	Finger Dexterity (FD) (.53, 2) (.59, 9) (.49, 18) Manual Dexterity (MD) (.50, 1) (.25, 2)
	P
Pattern Comprehension (PC)*	Spatial Orientation (SO) (.31, 3) (.40, 4) (.33, 10) (.24, 12) Perceptual Speed (PS) (.36, 3) (.23, 10) Verbal Comprehension (.46, 12 (.16, 18)
Pattern Discrimination (Pr)*	Aiming (Ai) (.36, 15)
Pin Moving	Manual Dexterity (MD) (.32, 1) Visual Feedback (.31, 1)
Pin Stick	Finger Dexterity (FD) (.19, 2) (.34, 9)
Plane Control	Control Precision (CP) (.38, 3) Multilimb Coordination (MC) (.41, 6) Speed of Arm Movement (SAM) (.49, 3)
Precision Steadiness (Errors)	Arm-Hand Steadiness (AHS) (.50, 2) (.56, 5) (.43, 6) (.34, 18)
Punch Board*	Arm-Hand Steadiness (.30, 2) (.05 right hand, 15) (.10 left hand, 15)
Purdue Pegboard (PP) (Sum of scores on the four variables)	Finger Dexterity (FD) (.43, 18) Manual Dexterity (MD) (.33, 18)

TEST	FACTORS, LOADINGS, AND REFERENCES
Purdue Pegboard (Assembly)	Finger Dexterity (FD) (.55, 2) (.43, 7) (.59, 9) (.35, 12) Manual Dexterity (MD) (.21, 2) (.32, 9) Perceptual Speed (PS) (.31, 7)
Purdue Pegboard (Both hands)	Finger Dexterity (FD) (.61, 2) (.66, 9) Manual Dexterity (MD) (.63, 1) (.21, 2)
Purdue Pegboard (Left hand)	Finger Dexterity (FD) (.58, 2) (.55, 9)
Purdue Pegboard (Right hand)	Finger Dexterity (FD) (.46, 2) (.60, 9)
Pursuit Aiming I (3/16th" diameter)	Aiming (Ai) (.68, 2) (.63, 9) Wrist-Finger Speed (WFS) (.50, 2) (.52, 9)
Pursuit Aiming II (1/8th" diameter)	Aiming (Ai) (.63, 2) (.63, 9) Wrist-Finger Speed (.48, 2) (.54, 9)
Pursuit Confusion (PC) errors	Arm-hand Steadiness (AHS) (.36, 6) (-.04, 18) Control Precision (CP) (.04, 6) (.37, 18) Pursuit Confusion Doublet (.31, 18)
Pursuit Confusion (PC) time on target	Control Precision (CP) (.04, 6) (.37, 18) Arm-Hand Steadiness (AHS) (.36, 6) (-.04, 18) Rate Control (RaC) (.30, 6) (.72, 7) (.58, 11) Pursuit Confusion Doublet (.35, 18)
	Q
	(none)
	R
Rate Control (RaC)	Control Precision (CP) (.30, 6) (.01, 7) (.24, 11) Rate Control (RaC) (.30, 6)(.72, 7) (.58, 11) Spatial Orientation (SO) (.17, 7) (.47, 18)
Restricted Manipulation	Finger Dexterity (FD) (.35, 15)
Rotary Aiming (RAi)	Aiming (Ai) (.22, 9) (.38, 15) Speed of Arm Movement (SAM) (.46, 2) (.38, 6) (.53, 7) (.02, 18) Wrist-Finger Speed (WFS) (.36, 2)
Rotary Positioning	Position Estimation (.45, 5)

TEST	FACTORS, LOADINGS, AND REFERENCES
Rotary Pursuit (RP)	Control Precision (CP) (.26, 3) (.49, 7) (.60, 18) Manual Dexterity (MD) (.17, 2) (.35, 11) (-.06, 18) Speed of Arm Movement (SAM) (.22, 2) (.47, 3) (.17, 6) (.20, 7) (.34, 10) (-.02, 18)
Response Orientation (RO) Test 0°	Perceptual Speed (PS) (.47, 4)
Response Orientation (RO) Test 45°	Perceptual Speed (PS) (.40, 4) Spatial Orientation (SO) (.34, 4)
Response Orientation (RO) Test 90°	Spatial Orientation (SO) (.69 4)
Response Orientation (RO) Test 135°	Response Orientation (RO) (.37, 4) Spatial Orientation (SO) (.48, 4)
Response Orientation (RO) Test 180°	Response Orientation (RO) (.40, 4) Spatial Orientation (SO) (.40, 4)
Response Orientation (RO) 225°	Response Orientation (RO) (.30, 4) Spatial Orientation (SO) (.35, 4)
Response Orientation (RO) 270°	Spatial Orientation (SO) (.30, 4)
Response Orientation (RO) 305°	Perceptual Speed (PS) (.36, 4)
Rudder Control (RC)	Control Precision (CP) (.45, 2) (.44, 6) (.52, 17) (.40, 18) Movement Prediction (.23, 17) Multilimb Coordination (MC) (.48, 6) (.36, 17) (.40, 18) (.52, 6) Single Integration/Differentiation Specific (.21, 17)
	S
Santa Ana Finger Dexterity	Aiming (Ai) (.17, 7) (.33, 15) Finger Dexterity (FD) (.16, 2) (.42, 7) (.46, 12) (.06, 15) Manual Dexterity (MD) (.47, 2) (.38, 11) (.28, 15) Spatial Orientation (SO) (.39, 7) (-.07, 11) (.20, 12)
Santa Ana Peg Turning	Arm-Hand Steadiness (.05, 2) (.32, 15) Aiming (Ai) (.17, 7) (.36, 15) Finger Dexterity (FD) (.16, 2) (.42, 7) (.46, 12) (.06, 15) Manual Dexterity (MD) (.47, 2) (.38, 11) (.28, 15) Spatial Orientation (SO) (.39, 7) (-.07, 11) (.20, 12)

TEST	FACTORS, LOADINGS, AND REFERENCES
Signal Discrimination*	Perceptual Speed (PS) (.40, 11) Response Orientation (RO) (.52, 11) Spatial Orientation (SO) (.35, 11)
Signal Interpretation*	Response Orientation (RO) (.30, 18) Spatial Orientation (SO) (.45, 18)
Single Differentiation/Integration (Electronic)	Control Precision (CP) (.40, 17)
Single Differentiation (Electronic)	Movement Analysis (.60, 17)
Single Dimension Pursuit Meter	Rate Control (RaC) (-.06, 6) (.64, 7) (.55, 11)
Spatial Orientation*	Spatial Orientation (SO) (.35, 10) (.34, 18) Perceptual Speed (PS) (.45, 10) (.30, 18)
Spatial Visualization*	Perceptual Speed (PS) (.35, 4) Visualization (V) (.73, 4)
Speed of Identification*	Spatial Orientation (SO) (.37, 3) (.32, 7) (.35, 10) (.16, 12) Finger Dexterity (FD) (.33, 7) (.10, 18) Perceptual Speed (PS) (.46, 3) (.43, 4) (.45, 7) (.47, 10) (.53, 18) Verbal Comprehension (VC) (.37, 12) (.20, 18) Visualization (V) (.38, 3) (.29, 10) (.06, 18)
Speed of Manipulation (Removing)	Aiming (Ai) (.32, 15) Finger Dexterity (FD) (.45, 15)
Square Marking*	Aiming (Ai) (.30, 2) (.31, 9) (.71, 15) Wrist-Finger Speed (WFS) (.29, 2) (.46, 9)
Steadiness (Printed)*	Arm-Hand Steadiness (AHS) (.31, 12)
Steadiness Aiming	Arm-Hand Steadiness (AHS) (.60, 2) (.40, 18)
Steadiness Tremor	Arm-Hand Steadiness (AHS) (.63, 5)
Stick and Rudder Orientation	Spatial Orientation (SO) (.53, 18) Visualization (V) (.57, 18)
	T
Ten Target Aiming (TTAi) corrects	Aiming (Ai) (.66, 2) (.31, 9) Speed of Arm Movement (SAM) (.72, 9) (.50, 18) Manual Dexterity (MD) (.05, 2) (.42, 18)

TEST	FACTORS, LOADINGS, AND REFERENCES
Ten Target Aiming (TTAi) errors	Speed of Arm Movement (SAM) (-.35, 2) (-.70, 9) (.63, 18) Manual Dexterity (MD) (.43, 2) (.35, 18)
Time Sharing (Electronic)	Movement Prediction (-.30, 17)
Time Sharing (Mechanical)	Control Precision (CP) (.26, 17) Time Sharing (.79, 17)
Time Sharing (Printed)*	Time Sharing (.71, 17) Single Integration/Differentiation (.21, 17)
Tool Functions*	Mechanical Experience (.83, 7)
Track Tracing (errors)*	Arm-Hand Steadiness (AHS) (.61, 2) (.61, 5) (.50, 6) (.42, 18) Finger Dexterity (FD) (.21, 2) (.35, 7) (.18, 13) Control Precision (CP) (.16, 2) (.29, 6) (.42, 7)
Two Hand Coordination (printed)*	Aiming (Ai) (.58, 15)
Two Hand Coordination (THC)	Control Precision (CP) (.25, 6) (.46, 11) Rate Control (RaC) (.32, 6) (.17, 11) Multilimb Coordination (MC) (.33, 6) (.30, 18)
Two Hand Matching	Response Orientation (RO) (.61, 3)
Two Plate Tapping	Control Precision (CP) (.41, 18) Manual Dexterity (MD) (.24, 12) (.35, 18) Speed of Arm Movement (SAM) (.54, 2) (-.05, 18) Wrist-Finger Speed (WFS) (.36, 2)
	U
Unidimensional Matching	Response Orientation (RO) (.61, 3)
	V
VDL Rings	Manual Dexterity (MD) (.44, 15)
Visual Coincidence	Response Orientation (RO) (.36, 6)
Visual Pursuit*	Control Precision (CP) (.24, 3) (.36, 7) (.20, 10) Perceptual Speed (PS) (.46, 3) (.28, 7) (.50, 10) (.35, 18) Spatial Orientation (SO) (.17, 3) (.22, 7) (.35, 18)

TEST	FACTORS, LOADINGS, AND REFERENCES
Visual Reaction Time (VRT)	Reaction Time (RT) (.56, 6) (.72, 12) (.48, 18)
Visualization of Maneuvers*	Spatial Orientation (SO) (.46, 18) Visualization (V) (.47, 18)
Weight	Static Strength (.70, 8) Dynamic Strength (-.43, 8)
Word Knowledge (Vocabulary)*	Verbal Comprehension (.78, 12) (.67, 18)

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Factors in Primary Perceptual-Motor Test Literature
(excluding Physical Proficiency Tests)

Ability to deal with linear extents (tentative)*.
Ability to deal with rotational magnitudes (tentative)
Aiming*+o
Arm-Hand steadiness*+o
Control precision +o
Finger dexterity +o
Integration (tentative)*
Manual dexterity +o
Movement analysis
Movement prediction
Multilimb coordination +o
Multiplication by a constant
Numerical facility *#
Perceptual speed *+#
Position reproduction*
Pursuit confusion doublet
Rate Control +o
Reaction time +o
Response orientation *+o
Spatial orientation *+#
Speed of arm movement *+o
Time sharing*
Verbal comprehension *+
Visual feedback
Visual sensitivity
Visualization *+#
Wrist-finger speed *+o

+ relatively more established factors
* measured by printed tests
o tests that relate to man-machine tasks and account for ability requirements in many systems
while these are not perceptual-motor factors, they represent cognitive and perceptual factors commonly associated with the perceptual-motor abilities required by many man-machine tasks

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13. ABSTRACT

The meeting herein reported constitutes a new and different ONRL approach to enhancing information exchange and cooperative research activity. An attempt was made to bring together as mahy investigators as possible from various countries of the world who are working in a narrow, confused, but increasingly important research area -- the psychological aspects of deep diving.

Invitations were extended to all known individuals from military, civilian, and industrial laboratories in the U.S. and Europe working on psychological problems associated with deep diving or hyperbaric atmosphere. A total of 12 persons, from three countries, accepted the invitation and participated in the Conference. When considered on an international basis, the participants represented approximately 90% of all psychologists identified with diving.

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